DOCUMENT RESUME

ED 162 472 EC 112 515

AUTHOR	Guralnick, Michael J.
TITLE	Integrating Handicapped and Nonhandicapped Preschool Children. Final Report.
INSTITUTION	Ohio State Univ., Columbus. Dept. of Communication.
SPONS AGENCY	Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.
PUB DATE	78
GRANT	G007604055
NOTE	322p.; Print is poor on some pages and may not reporduce well in hard copy
EDRS PRICE	MF-$0.83 HC-$16.73 Plus Postage.
DESCRIPTORS	Case Studies; Exceptional Child Research; *Handicapped Children; Interaction; *Mainstreaming; *Peer Relationship; Peer Teaching; Play; Preschool Education; *Program Effectiveness; *Social Relations; *Student Placement; Tutoring
IDENTIFIERS	Final Reports

ABSTRACT

The final report summarizes three studies on the efficacy of preschool programs in which handicapped and nonhandicapped children are integrated. In the first section, analyses of the social interaction of 37 4- to 6-year old children are presented. Among results cited are that nonhandicapped and mildly handicapped Ss interacted more frequently with each other than expected on the basis of availability and less frequently than expected with moderately and severely handicapped children. The second study describes a tutoring program in which eight nonhandicapped children served as change agents for 12 less advanced children. The final section describes a series of case studies involving 11 pairs of children. Among major conclusions cited is the feasibility of direct instructional interaction in free play settings between mildly handicapped and nonhandicapped children. (CL)

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ED162472

INTEGRATING HANDICAPPED AND NONHANDICAPPED PRESCHOOL CHILDREN

Final Report submitted to:

Research Programs Branch
of the
Bureau of Education for the Handicapped

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[1] The work reported herein was supported by Grant G00-76-04055 from the United States Office of Education, Bureau of Education for the Handicapped.

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General Conclusions

Acknowledgements

This research was supported by Grant Number G007604055 from the United States Office of Education, Bureau of Education of the Handicapped. A special debt of gratitude is owed to the Project Officer, Dr. Jim Hamilton, for his support and advice.

A complex series of studies such as those reported here requires the assistance and dedication of a large number of people. First, it must be noted that this research project was superimposed upon an ongoing demonstration program, which was part of the First Chance Network. The teachers in that program, the children, and the parents not only provided cooperation but actively assisted in clarifying many of our procedures. To them, and especially to the Coordinator of the program, Deborah Tupper, I am very grateful.

Polly Heavenrich, Mark Maile, and Mark Arenas served as research assistants for the entire project. Their understanding of the integration process, their enthusiasm, and hard work to ensure the objectivity of their observations were major factors that enabled this research to reach a successful conclusion.

For the last few years I have been joined by my colleague, Diane Paul-Brown, in analyzing the language interactions that occur among handicapped and nonhandicapped children. The research reported in Study II was a joint effort and her involvement and expertise should be recognized.

Dr. William Schafer of the Department of Measurement and Statistics at the University of Maryland served as the project's statistical and computer consultant and his advice and counsel

were critical to enable us to effectively analyze the considerable data generated by these studies.

Finally, a number of people provided critical technical support. Ellen Weinhouse provided important feedback on each section which was an important contribution. An earlier draft of Study III and all of the protocols and preparatory materials were organized and typed by Vivian Ottenberg. I am once again in her debt. Dan Kramer is thanked for his help in facilitating the completion of the art work in conjunction with Medical Illustrations, as well as providing some much needed photographic services. The final manuscript, however, in all its many phases and forms, was typed and organized by Marilee Darr. An acknowledgement here cannot possibly reflect the magnitude of her contribution to the completion of this project.

INTRODUCTION

The forces that have shaped the process of social change that has resulted in the integration of handicapped and nonhandicapped children in educational settings are many and varied. At one level they include concerns about labeling, the efficacy of segregated programs, and the impact of isolation on the attitudes of society towards handicapped children (see Guralnick, 1976, 1978a). From a broader perspective, society's recognition of the right to education and right to treatment for every individual, and a better grasp of the nature of behavioral diversity have been contributing factors.

Recently, Bricker (1978) examined the social-ethical, legal-legislative, and psychological-educational issues in this regard and developed a rationale urging the exploration of integrated programs. An analysis of these arguments leaves little doubt that the active pursuit of alternative educational strategies and environments that include nonhandicapped children is essential. However, in doing so, we should be aware of the social context of this effort and the complex and experimental nature of the integration process. As Hartup notes, "Most classroom learning is _social_ learning and experimentation with the composition of classrooms is _social_ experimentation." (1978, p.46). Accordingly, an initial step in an analysis of the impact of a complex social program requires careful consideration of the dimensions across which such programs are to be evaluated.

Goals and Measures of Success of Integrated Programs

Feasibility is perhaps the most essential concept in the design of integrated programs. Here, we simply ask--can the needs of all children be met by the program without radically departing from the fundamental assumptions and structure of the program's model? Certain changes are, of course, necessary. For example, one needs to consider adapting the curriculum, modifying the instructional strategies, and re-designing physical space. The availability of supportive services and inservice training are critical elements as well. If a program can maintain its primary thrust in all of its forms while meeting the needs of all children, then integration is considered to be feasible.

An evaluation as to whether a program has indeed achieved feasibility, as described here, has taken many forms. At a product level, the use of standardized tests, criterion-referenced instruments, or direct observation techniques of, say, the child's social play, have been employed by various programs. The selection of assessment instruments and areas for evaluation are based on the goals of the program and will vary accordingly. However, there is internal consistency with regard to success. Similarly, longitudinal studies of the child's development and progress beyond the preschool years should also be considered in this category.

At a more process, day-to-day, level, an analysis of feasibility often includes the assessment of what is perhaps best characterized as the "face validity" of the program. For example, do the activities "flow" as they had prior to the introduction of handicapped children, are the individualized educational programs sensible and the corresponding services available, and are all children acquiring short-term objectives at an acceptable rate?

Finally, many programs would include in their definition of feasibility that some degree of actual social interaction among children at different developmental levels has occurred. Included here is the notion that interaction among children at different developmental levels should be productive interactions. That is, exchanges should be positive in affect, and the content should be consistent with each child's level of development. Feasibility could be achieved here if, based on our knowledge of education and development, we can conclude from our observations that these interactions are productive. Moreover, concerns for evaluating the attitudes of nonhandicapped children in relation to their handicapped peers, as well as a means of assessing the attitudes and satisfaction of parents are also often expressed at the level of feasibility.

As will be seen in a brief literature review in a succeeding section, the evaluation of feasibility has indeed taken the many forms that have been described here. Typically, when evaluation is attempted, most programs have included at least some form of product assessment in combination with one or more aspects of face validity.

After Feasibility

Once feasibility has been achieved, an entire array of other questions, mostly relating to the efficacy or comparative effectiveness of integrated programs can be asked. Although some notions of efficacy are inherent in the concept of feasibility, the criteria employed for efficacy are usually ones reflecting a broad threshold of acceptability and are essentially demonstration efforts. For example, in the product assessment of feasibility using standardized tests of intellectual development, the question typically asked is, "Do the children do at least as well as one might expect in a nonintegrated setting?" Past experience, analyzing rate changes, and reference to normative data usually form the basis for answering the overall feasibility question. No attempt to compare children other than on the broad basis of past history and expectations are attempted.

However, once feasibility has been established, although the product and process questions should still be addressed, more detailed analyses become possible. For example, a comparison of feasible segregated and integrated environments is now appropriate. Specifically, it can be asked, does the level of social play vary with the composition of the group, do children play more constructively in one or another environment, and which models do children select for imitation in the various settings? Conceptually, analyses of this type are essentially examinations of the nature of different environments in terms of their actual or potential ability for providing educational and therapeutic benefits to all concerned. As noted, these more detailed analyses should also contain some basis for comparison across the product measures discussed earlier.

The concept of different environments having a varying potential for producing developmental changes is extremely important in the analysis of integrated settings. Although different types of programs may not at this stage of our development appear to have a differential impact, an analysis may reveal that certain environments are richer than others and do provide potential opportunities for development that are not found in other environments. An analysis in this form would recommend a search for instructional strategies that would maximize the use of the opportunities identified in the more challenging environment.

Overview of this Research Report

In light of this background, the purpose of this research was to intensively study interactions among children at different developmental levels from three different perspectives. In the first section of this report, analyses of social interactions will be presented. In general, two questions were addressed: (1) what is the nature of the interactions among children at different developmental levels during play? and, (2) when comparing homogeneous vs. heterogeneous groupings of children during play, are there differences in the social participation, constructiveness of play, teacher behavior, or the nature of communicative behavior?

The first question relates more to the concept of face validity in that this study is simply analyzing the nature of the interactions and then asking if they appear to be productive in light of our knowledge of such interactions. The second question, however, relates directly to the notion of efficacy in that environments differing in terms of the composition of the children are being compared.

The second section of this report describes a series of case studies in which nonhandicapped children were serving as agents of change for less advanced children. Since it has been suggested that one potential value to handicapped children in integrated settings is the availability of advanced peers for direct "tutoring", in the broadest sense of the term, a detailed analysis of this process was carried out with special emphasis on its generalized impact.

Finally, the third section examines the linguistic interactions of nonhandicapped children as they address mildly, moderately, and severely handicapped peers in an instructional type of activity. This analysis also relates to the face validity and potential for growth issues, since the focus of this study is on the potential developmental significance of these linguistic interactions for the less advanced children.

STUDY I

There has been a remarkable resurgence of interest in the nature of peer social interactions within the last few years, and the development of early social interactions in peers and the corresponding interpersonal relationships that are forged now appear to play a more prominent part in the young child's life than was originally anticipated (Lewis & Rosenblum, 1975). In fact, in this time, it has become increasingly clear that the development of reciprocal social interactions among children and the child's constructive use of toys and materials can have a profound effect on later development (Bandura, 1969; Hartup, 1978).

A number of observers have commented (Bruner, 1972; Bruner, Jolly, & Sylva, 1976; Hartup, 1978; Weisler & McCall, 1976) that perhaps one of the most significant aspects of social play interactions lies in its ability to permit children to explore actions in relatively non-threatening situations. Moreover, as Weisler and McCall (1976) have noted, "...it is widely acknowledged that such behavior is a key ingredient in...adaptability, learning, cognition, education, and social behaviors..." (p. 492).

The development of productive social and play interactions of handicapped preschool children is a major goal shared by virtually all intervention models (Anastasiow, 1978). Although there are many other aspects, it is the expectation of many that integrated programs may well have a positive impact on the social and play development of handicapped children in integrated settings. There are many reasonable arguments to support this contention, exemplified by these comments by Bricker and Bricker

(1971):

> The ways in which a non-delayed child plays with toys and other objects in the classroom and playground provides greater variation in the types of activity available than that provided by the more limited repertoires of the delayed youngsters. This modeling of object-relevant play may provide a better instructional medium than a teacher demonstrating the same activity directly, since both approximations to relevant use and greater variations in the use of objects are evident in the play behavior of the non-delayed child. (pp.3-4)

Other arguments suggesting the value of integrated settings for promoting social development related to the concepts of observational learning, frequency of interactions, and the development of positive social interactions among children at different developmental levels can be found in Guralnick (1976, 1978b) and Snyder, Apolloni, and Cooke (1977).

Despite the apparent cogency of this position, there is little supportive empirical data available. In fact, of the few studies that have directly observed interactions among preschool children of different developmental levels, most have revealed a substantial degree of separation between handicapped and nonhandicapped children. For example, Ray's (1974) analysis of the interactions of delayed and non-delayed toddlers revealed that they interacted only on a very limited basis. This was also supported by Apolloni and Cooke's (1978) results within an imitation training paradigm.

Somewhat more positive findings were obtained, however, in a recent study by Peterson and Hardick (in press) in which evidence of more effective social integration was noted. Nevertheless, even in this instance, over 70% of the nonisolate play interactions of nonhandicapped children included other nonhandicapped children. Moreover, when only handicapped playmates were available, nearly 62% of the play of nonhandicapped children was isolate play and less than 10% was cooperative. This preliminary study did not present a breakdown of the developmental levels of playmates that were chosen, but it is possible that most of the integrated play interactions that did occur included the mildly handicapped children, thereby indicating some degree of separation again for the more severely handicapped children. In fact, even when we look at interactions of nonhandicapped children in mixed-age classrooms we find a strong tendency for interactions to occur within same-age groups, although there is considerable contact outside these ages as well (see review by Goldman, 1976).

Along these same lines, Ispa and Matz (1978) studied the social play and types of peer interactions that develop in an integrated setting. Analyzing data obtained from two integrated classrooms operating within a cognitively oriented framework, they found clear evidence for the presence of social integration. It is important to note that most of the handicapped children manifested relatively mild handicaps, were older by slightly more than one year on the average than their nonhandicapped peers, and, perhaps most importantly, their levels of social play as measured by the Parten (1932) scale were virtually identical to the nonhandicapped group. These conditions, among others, appear to be very favorable in terms of promoting social interaction.

Ispa and Matz (1978) took this study one step further and compared the progress of the handicapped and nonhandicapped children on standardized measures of cognitive development. This product evaluation found that both handicapped and nonhandicapped children progressed at a rate considerably beyond that which would be expected through normal growth on the basis of standard test norms, and, perhaps most importantly, both groups of children achieved similar average gains. These product data support similar findings as related by Bricker and Bricker (1972) for delayed and non-delayed toddlers, and are compatible with the follow-up data for hearing-impaired youngsters as summarized by Northcott (1978).

In partial summary, the extremely limited data on the extent to which social integration occurs between handicapped and nonhandicapped preschool children suggests that separation is likely to result when the disparity among the developmental levels of the children is substantial. However, it does appear reasonable to expect considerable social integration between nonhandicapped and mildly handicapped children in programs that are supportive, that adjust chronological ages appropriately, and that roughly match children in terms of the level of social play. These conclusions are tentative at best since, as indicated, available data are meager. Furthermore, factors relating to age, composition of groups, teacher-child ratios, and type of intervention program, have not received any systematic attention (see Guralnick, 1976).

A concern about the extent of social integration and an assessment of the progress of all children in integrated settings speaks primarily to the issue of feasibility and not comparative effectiveness or efficacy of the programs. There is some relationship, of course, between efficacy and feasibility. Assuming that interactions with nonhandicapped children can benefit handicapped children, a lack of social integration certainly limits the potential effectiveness of integrated programs. Nevertheless, even without extensive social integration, integrated programs can still turn out to be more effective than segregated programs due to the potential richness of the integrated environment for observational learning, modified teacher behavior, or other correlated factors.

The question of efficacy, however, is of considerable importance in and of itself. Unfortunately, a search of the literature failed to uncover any studies systematically comparing children's development in integrated as compared to nonintegrated settings. The only comparative data that are available are those involving comparisons of advantaged and disadvantaged children and comparisons of nonhandicapped children in mixed-age and same-age classrooms. In the study by Feitelson, Weintraub, and Michaeli (1972) disadvantaged and advantaged Israeli preschool children were assigned to either homogeneous (disadvantaged only) or heterogeneous classrooms. Analyzing records from naturalistic observations of the children during indoor free-play periods into social interaction units (SIUs), these researchers found that: (1) overall, the number of SIUs increased from the first observation to the second (the time interval was from 16-18 months), (2) the number of SIUs differed among the groups in the following order from high to low: advantaged, heterogeneously grouped disadvantaged children, and finally, the homogeneously grouped disadvantaged, and (3) cooperative responses with adults did not change over time for heterogeneously grouped disadvantaged children while cooperative responses with peers did increase but to a level considerably lower than the other two groups. For the other two groups (homogeneously grouped disadvantaged and heterogeneously grouped advantaged children) cooperative responses with other children increased substantially (to over 40% of SIUs for each), but cooperative responses with adults decreased.

Further detailed analysis of these data revealed that little social integration was evident in the heterogeneous groups and that separation increased considerably over time. Accordingly, the authors suggested that the heterogeneously grouped disadvantaged children engaged in a smaller percentage of cooperative responses with peers due to the fact that fewer playmates were effectively available in the heterogeneous group than in the homogeneous group. The authors noted that varying degrees of social interaction among the groups would occur but, "...in order to achieve its end, heterogeneous grouping at the preschool stage seems to require a directive teaching approach as well as very able teachers" (p.1258).

With regard to the efficacy question, the finding that fewer cooperative responses with peers occurred in the heterogeneous group than in the homogeneous group is, at first consideration, disturbing. However, Feitelson et al., do point out that,

> It must be remembered that while the ability to sustain play with peers is certainly one of the aims of a preschool experience, it is not the only one. Moreover, a paucity of social interactions during one type of activity--in this case, the indoor free play period--should not be taken to imply that there was also little contact during other activities or that no learning was taking place. It might well be that [disadvantaged] children ingest knowledge while observing [advantaged] children at play, even when [disadvantaged children] do not participate actively themselves. Knowledge of this kind could then be put to use within their own group, especially when the other members of it had also been exposed to similar experiences. Actually, the narrative records do reveal instances in which the play of [advantaged children] was later imitated by [disadvantaged children] (pp. 1258-1259).

Interestingly, the social interaction study by Devoney, Guralnick, and Rubin (1974) reported evidence of this delayed imitation effect for a group of handicapped and nonhandicapped children.

Comparisons between preschool children in same and mixed-age classrooms may be helpful in understanding the effects of integrated programs. Hartup (1978), reporting on work by Lougee, Grueneich, and Hartup (in press), compared the social interactions of pairs of children similar in age (3-year and 5-year-old groups) and different in age (sixteen months average difference) in a laboratory type study. Defining sociability in terms of the number of social contacts, it was found that sociability increased in this order: young same-age group, mixed group, and older same-age group. Of most interest, three-year-olds were more sociable when interacting with five-year-olds than with other three-year-olds. On the other hand, five-year-olds were less sociable with the younger children than with other five-year-olds, thus accounting for the intermediate sociability position of the mixed age group.

In the most comprehensive naturalistic study to date, Goldman (1976) compared the social interactions and level of social play in three classrooms differing in chronological age composition: (1) three-year-olds, (2) four-year-olds, and (3) three- and four-year-olds. The results were complex but indicated that the pattern of interaction was affected by the composition of the peer group. Three-year-old children had a greater number of positive interactions and engaged in more solitary play in the mixed age classrooms compared to same-age classrooms and also spent less time in parallel play and teacher directed activities. Similarly, for the four-year-olds, more frequent positive interactions, more solitary play, but less parallel play and adult oriented activities were noted in the mixed-age than in the same-age classrooms. In accordance with the analysis by Rubin, Maioni, and Hornung (1976) regarding the role of solitary play, these findings were interpreted as evidence for the existence of more advanced social play during the mixed age condition[1].

Accordingly, among normally developing children, differences do occur as a function of age group composition. Extrapolating these results to settings integrating children of varying developmental levels, we would expect to find differences as a function of group composition as well. Nevertheless, as Hartup (1978) points out, the implications of findings such as Goldman's (1976) for social development are not at all well understood.

The variety of findings reviewed in this section underscores the complexity of both the theoretical and experimental issues confronting those interested in understanding the interactions among children at different developmental levels. Empirical evidence is either meager, conflicting, or fraught with methodological problems, yet the problem is clearly one of major developmental significance. With this background, the following experiment was designed to examine the nature of social integration among children at different developmental levels and to determine if social participation, constructiveness of play, teacher behavior, and the nature of communicative interactions vary as a function of group composition.

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[1] It is important to note that even under the best of conditions it is extraordinarily difficult to control potentially confounding factors in efficacy studies such as Goldman's. The results of the study must be viewed with caution since the four-year-olds in the same-age classes were significantly older than the four-year-olds in the mixed-age classes, and the teachers' behavior and curriculum may well have differed across the different groups. Furthermore, no measure of the constructiveness of play was used, and the positive interaction category may not have provided a sufficiently sophisticated reflection of the quality of the children's interactions.

This research focused primarily on an analysis of the effects of combining two groupings of children--a group of severely and moderately handicapped children and a group containing both nonhandicapped and mildly handicapped children. Specifically, the behavior of children and teachers was compared when children were in relatively homogeneous groups (severe and moderately handicapped children as one group and mildly and nonhandicapped children in the other) to those instances in which they were combined into more heterogeneous groups (all developmental levels). Our own experience, informal reports of other programs, the fact that mixed-age programs are common such as in day-care, and some supportive data (e.g., Ispa & Matz, 1978), suggested that social integration between nonhandicapped and mildly handicapped children is highly feasible and subject to a minimum of controversy and resistance. Consequently, questions concerning the comparative effectiveness of integrated settings for nonhandicapped and mildly handicapped children alone were not addressed, although interactions between children in those two groups were investigated.

The involvement of moderately and severely handicapped children with more advanced children, however, poses a different set of issues, and, as noted above, available data suggest that these children tend to remain separate from the more developmentally advanced children. The efficacy question was raised here and, as discussed, was examined by comparing the behaviors of children in each of the four developmental groups and teachers in a relatively homogeneous setting to their behavior in a heterogeneous setting.

Conceptually, this study assessed the relatively immediate effects of environmental change on social interactions within the broad framework of the impact of structural-ecological factors (Greenwood, Walker, & Todd, 1977; Gump, 1975; Nordquist, 1978). As will be seen, the particular experimental design employed here was compatible with this approach in that all comparisons were within-subject comparisons, i.e., the same children participated in both homogeneous and heterogeneous conditions. Although some concerns were generated as a result of this design, such as the potential for carry-over effects between the two conditions, this design did permit control of such potentially confounding factors as the curriculum, staff, and physical setting. Accordingly, although there are certain limitations to this design, alternative efficacy designs seemed to be even more limiting (see Kaufman & Alberto, 1976).

Method

Subjects

Thirty-seven 4- to 6-year-old children enrolled in the integrated Experimental Preschool program participated as subjects in the experiment. For design and analysis purposes, the children were divided into four developmental groups: Nonhandicapped (NH), Mildly handicapped (Mi), Moderately handicapped (Mo), and Severely handicapped (S). Categorization of children into groups was based jointly on their performance on standardized developmental tests and expressive language usage as measured by mean length of utterance (MLU) to adults (sample of 100 utterances). In addition, behavioral information obtained from teachers and parents was occasionally utilized. Children in the NH group revealed no history of developmental delays or behavioral problems, had an age-appropriate MLU, and scored within the average range (defined here as 80 or above) on two of the three standardized tests administered (i.e., the McCarthy Scales of Children's Abilities (MSCA)--scores based on general cognitive index, the Peabody Picture Vocabulary Test (PPVT), and the Preschool Language Scale (PLS)--scores based on language quotient). Children with mild handicaps failed to meet the above criteria but achieved a score of 60 or above on at least one of the three standardized tests (in actuality, all but three children scored 60 or above on two of the three tests), and had an MLU above 2.50[2]. Placement in the moderate group resulted for those children who failed to meet the criteria for placement in the mild or severe groups, and failed to score above 50 in two of the three standardized tests or whose MLU was less than 2.50. Finally, children were placed in the severely handicapped group if they failed to reach basal level on one of the three tests and had an MLU of less than 2.00[3]. For this group, 64% of the children were nonverbal, 55% did not reach basal level on any of the three tests, and only two children reached the scorable range on all three tests (mean score 31). Using these criteria, 12 children were assigned to the NH group, 9 to the Mi group, 5 to the Mo group, and 11 to the S group.

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[2] One child in the Mi group did actually meet the statistical criteria for categorization in the NH group, but due to his history of behavioral problems and judged low level of social development, the Mi classification seemed most appropriate.

Insert Tables 1 and 2 about here

Tables 1 and 2 summarize the mean scores for each developmental group. Table 1 reveals that an average of 30-35 points separated the different groups. Similar differences for the PLS (see Table 2) were obtained and there was an ordering in terms of MLU for the four developmental groups as well. In addition, it is important to note that the chronological age (C.A.) for the NH group was approximately one year less than that of the Mi and Mo groups. The severe group (average C.A. = 5-3) was very heterogeneous with respect to age, with four children 4-5 and younger and four children 6-3 and older. Since the results of the experiment did not reveal a relationship between

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[3] One child did have an MLU above 2.00 but due to his low level of usage and overall test scores, it was judged that placement in this group was most appropriate.

TABLE 1

Comparisons among the Developmental Groups for Two Measures of General Developmental Level and Chronological Age

Pre Measures

Group	C.A.	Measures[1,2] MSCA	PPVT
Nonhandicapped	4-11	95.4	97.7
Mild	5-11	60.4[3]	63.0
Moderate	5-10	____[4]	33.3[5]
Severe	5-3	____[6]	____[7]

[1] All data represent means.

[2] C.A. = chronological age; MSCA = McCarthy Scales of Children's Abilities; PPVT = Peabody Picture Vocabulary Test.

[3] An estimate for four children is included in the mean due to the fact that they scored below the lowest range of the scales.

[4] Eighty percent of the children did not reach the lowest level of the scales. Mean composite raw scores for the nonhandicapped, mild, and moderate groups are 117.1, 85.2, and 34.2, respectively.

[5] Based on scores of four children including an estimated score for one child who fell below the tabled range. One child could not be tested due to visual problems.

[6] Basal not reached by 55% of the children on either the MSCA or Stanford-Binet.

[7] Basal not reached by 82% of the children.

TABLE 2

Comparisons among the Developmental Groups for Two Measures of Language Development

Pre Measures

	Language Measure[1]	
Groups	Preschool Language Scale[5]	MLU[2]
Nonhandicapped	109.2	5.5
Mild	78.0	4.8
Moderate	52.6	3.7
Severe	____[3]	<1.0[4]

[1] Data based on means.

[2] MLU = mean length of utterance.

[3] Basal score not obtainable.

[4] Seven of 11 children were nonverbal.

[5] Zimmerman, I. L., Steiner, V. G., and Evatt, R. L. Charles Merrill Publishers, Columbus, Ohio.

chronological age for the severe group and the dependent measures, a focus on the performance measures as related to developmental level can be maintained.

The differences among the groups, however, do tend to mask the variability inherent in a categorization process such as the one employed here. Although these classifications are necessary to provide order and structure to the data, and may well reveal valid and generalizable principles that can be applied to definable groups, later discussions will address the analysis of individual differences. Indeed, a perusal of the Appendix, which presents the individual scores used for these categorizations, provides a sense of this diversity.

Settings

Data were collected in two separate settings: (1) during free play, and (2) during gross-motor play. Each of two large double classrooms separated by a central area for gross-motor play served as the setting for free play as well as for lessons and other more structured activities. Each classroom play area included the usual assortment of toys and related materials to which all children had access. Typically, the room would be divided into various functional areas such as a block corner, space for puzzles and manipulatives, dress-up areas, and equipment for sand and water play. It is important to point out that one classroom maintained essentially the same functional areas and materials as the other on any given day. The free-play period chosen for study took place at 11:00 a.m. and lasted for about 30 minutes. On a predetermined schedule (see Procedure section below) approximately half the children would engage in play in the classroom on one side (as noted classrooms were separated by the gross-motor area), and half on the other.

The central play area separating the two double classrooms served as the setting for gross-motor activities. This space contained climbing equipment, mats, and other indoor equipment generally used for gross-motor activities for young children. All 37 children participated simultaneously in gross-motor activities. The gross-motor period took place at about 10:00 a.m. and also lasted for about 30 minutes.

The integrated program

By way of additional background on the structure and operation of the integrated program, the following description is presented.[4] Children with relatively mild handicaps and the nonhandicapped children occupy one double classroom and are completely integrated for all activities. Children with severe handicaps as well as those with more moderate delays are located in the second double classroom and are involved with more advanced peers on a selective basis. Decisions regarding the extent of each child's involvement in integrated activities are based on the child's responsiveness to social interactions and reinforcement, the level of development of his or her observational and imitative repertoires, and the severity and extent of any behavior problems. Nevertheless, the proportion of time spent in integrated activities, even for children with extremely underdeveloped skills in this regard, is quite substantial.

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[4] Portions of this section were taken from Guralnick (1978b).

Moreover, more advanced children are frequently employed in assisting less advanced children to develop in these areas so as to enable them to benefit more fully from integrated activities.

Classroom events consist of a variety of structured and unstructured activities common to most preschool programs, but with a strong emphasis on systematic observation, planning, and evaluation-feedback systems for each developmental area (Guralnick, 1975). Lessons, with a primary focus on cognitive and language development, are arranged for children grouped in terms of their progress in particular curriculum components. In addition, heterogeneous groups of children participate in lessons, often with the composition of the group and the selection of specific lesson activities designed to foster the development of the less advanced children in the group. Within the group format, planned interactions are geared to each individual child. Observations of these lessons would find the teacher moving from one child to another adjusting her interactions to each, asking questions of the entire group from time to time, providing for extensive utilization of materials, requiring action sequences and child-child interactions whenever possible, and in general, orchestrating the elements of the lesson for all children as a social unit.

In addition to instructional or therapeutic teacher-child interactions conducted on a one-to-one basis as needed, numerous less structured activities, including various play, music, art, and other events, form additional key components of the program and constitute the majority of the day. In these latter instances, especially play activities, children from all developmental levels, restricted only by the conditions of the experiment (see Procedure below) are integrated, and the processes and techniques related to reaping the potential benefits from the interactions of children at various developmental levels are systematically applied.

The content and sequence of the curriculum components themselves are based on data derived from the structure and strategies associated with normal developmental patterns and have been subjected to various empirical tests. In general, our approach can best be described as a cognitive learning model (see Anastasiow, 1978). The organization of the curriculum accentuates the role of the social context, facilitates individualizing even in group lessons, and provides a systematic basis for structuring interactions in an integrated setting.

Experimental Design

The effects of three major variables on a variety of measures were investigated in this study. The four developmental levels (DLs) discussed above constituted the first factor. Second, and of most significance, was the effect of group composition. Specifically, this factor was defined in terms of the relative homogeneity of the groups with regard to developmental level. Two relatively homogeneous groups were formed. The first consisted of all children categorized as nonhandicapped and mildly handicapped, and the second consisted of those classified as moderately and severely handicapped. These two relatively homogeneous groups constituted the "nonintegrated" or unmixed condition for the group composition factor. (Please note that these groupings correspond to the normal "home room" for each group as described in the preceding section.) Scores obtained for the various dependent measures for the unmixed condition were compared with those obtained in the "integrated" or mixed condition in which children from all four developmental levels (instead of the two DLs for the unmixed or homogeneous groups) were systematically integrated. Accordingly, the group composition factor consisted of mixed (heterogeneous grouping) and unmixed (homogeneous grouping) conditions.

The third major variable was designed to determine if changes on the dependent measures for the group composition and DL factors varied as a function of time. Accordingly, measurements were obtained during the early part of the school year (September-November), referred to as the "pre" condition, and once again during the latter part of the year (April-June), referred to as the "post" condition. Consequently, the basic design called for a 4 (NH vs. Mi vs. Mo vs. S) x 2 (mixed vs. unmixed) x 2 (pre vs. post) analysis, although, as discussed later, a variety of different analyses were performed. As clarified in the procedure section, the DL factor was a between-subject comparison, but all other analyses were within-subject comparisons.

The effects of these variables were investigated separately for both the free and gross-motor-play settings. However, the gross-motor setting did not include the group composition factor, i.e., it was always mixed although certain comparisons were made between these two settings. Moreover, a number of separate analyses for the mixed conditions only for both free and gross-motor play were carried out. A full description of the analyses is presented in a later section.

Procedure

Free play

The group composition factor was varied by arranging the free-play schedule such that mixed play occurred three days per week and unmixed free play the remaining two days. On mixed days, one-half of the total number of children present were equally divided between the two classrooms. Equal division of children in each classroom for each developmental group was also required. Decisions for placement of children were made by establishing a predetermined random schedule with the restriction that, across a block of twelve mixed days, each child spend an equal number of play periods in each of the two classrooms. On unmixed days, each of the two relatively homogeneous groups remained in their home classrooms.

To ensure that the composition of the groups was the primary factor affecting any possible differential behavior of the children and adults in the mixed and unmixed conditions, the nature of the materials in each classroom, the number of adults, and the scheduling of adults were factors that were maintained at a constant level or randomized.[5] Specifically, the number of adults (teachers and assistant teachers) was typically maintained at four on each side. The exact number sometimes varied but equality of numbers was maintained. Similarly, the type and number of toys and activities (functional areas) were the same for each classroom for a given day. Finally, the placement of teachers and assistant teachers in one or the other classroom was randomized. Teaching staff were randomly assigned to each classroom, with the restriction that no more than three days pass without changing classrooms and that within a four-week period each teacher spend one-half of her time in one classroom and one-half in the other.[6] This schedule was maintained throughout the year even when data were not being collected. However, the strict adult-to-child ratios were not adhered to during the non-data collection times and a variety of specialized procedures were often in effect.

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[5] It should be noted that one possible confounding factor for the group composition variable is that the approximate teacher-to child ratios for the homogeneous groups were 1:4 for the severe and moderate group and 1:5 for the mild and nonhandicapped group. This contrasts with the 1:4.6 average ratio for the heterogeneous groups. The potential impact of these differences will be discussed at a later point.

Gross-motor play

The gross-motor play period (approximately 10:00 a.m. to 10:30 a.m.) occurred daily, although recordings during pre and post periods were spaced to approximate the schedule of recordings for the group composition conditions during the free-play period. All 37 children and all eight staff participated during this period with no group composition factor under study.

Recording

Pre (September-November) and post (April-June) recordings were carried out on a time sampling basis for each child for each setting. Specifically, each child was observed for a consecutive four-minute period. This period was divided into repetitive cycles of ten seconds for observation of the target child and a five-second interval for recording (see behavior categories below). Four such recordings per child for each setting (free and gross-motor play) and for each group composition condition (mixed and unmixed) were obtained during pre and during post periods.

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[6] This entire procedure was designed to minimize the possibility that any obtained differences in the group composition could be due to the fact that the children were in a different free-play area for half of the time during mixed play. Analysis of the children's scores in the different areas confirmed this expectation and separate analyses for each play area for the mixed condition were not carried out.

Ratings began two to three minutes after the start of the play period to allow time for the flow of play activities to develop. Children were rated on a random basis with restrictions to ensure an equal number of ratings for each child in each of the two classrooms and to distribute those ratings equally over time. Three trained raters (see section on Reliability) shifted from child to child as necessary, recording in as unobtrusive a manner as possible.

Behavior Categories and Coding Procedures

As indicated, each child was observed over a number of four-minute recording periods. The child under observation at a given time was referred to as the target child. For each observation interval three general classes of behavior were observed and categorized: (1) the target child's behavior, (2) the behavior of peers to the target child, and (3) the teacher's or adult's behavior to the target child. A description of each behavior category and corresponding coding procedure are presented below. Given differences in the free-play and gross-motor-play settings, slight modifications of each setting were devised.

Free play

A. Target child's behavior

1. Social play rating: The categories used for this rating were based on the Parten (1932) scale of social participation with minor modifications, including those noted by Wintre and Webster (1974). These categories and their definitions, most of which were directly taken from Parten (1932) are:

> a. Unoccupied behavior: The child apparently is not playing, but occupies himself with watching anything that hapens to be of momentary interest. When there is nothing exciting taking place, he plays with his own body, gets on and off chairs, just stands around, follows the teacher, or sits in one spot glancing around the room. A variety of rhythmic, self-stimulatory behaviors not focused around toys or other materials would be included here. If toys or materials are actually the focus of attention, classify as solitary, parallel, or cooperative play. That is, if the child is making eye contact and manipulating objects, classify as solitary, parallel, or cooperative play. Merely holding an object without attending to it visually should result in a classification of unoccupied behavior.
>
> b. Solitary independent play: The child plays alone and independently with toys that are different from those used by the children within speaking distance and makes no effort to get close to other children. He pursues his own activities without reference to what others are doing.
>
> c. Onlooker: The child spends most of his time watching the other children play. He often talks[7] to the children whom he is observing, asks questions, or gives suggestions, but does not overtly enter into the play himself. This type differs from unoccupied in that the onlooker is definitely observing particular groups of children rather than anything that happens to be exciting. The child stands or sits within speaking distance of the group so that he can see and hear everything that takes place.
>
> d. Parallel activity: The child plays independently, but the activity he chooses naturally brings him among other children. He plays with toys that are like those which the

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[7] Where the words talk or conversation appear, adjustments for less linguistically advanced children were made to include communication in a variety of nonverbal forms. Also note that communication was not essential for an onlooker categorization.

children around him are using, but he plays with the toy as he sees fit, and does not try to influence or modify the activity of the children near him. He plays beside rather than with the other children. There is no attempt to control the coming or going of children in the group. The target child must be within three feet of other children to have play classified as parallel.

e. Associative play: The child plays with other children. The conversation concerns the common activity; there is a borrowing and loaning of play material; following one another with trains or wagons; mild attempts to control which children may or may not play in the group. All the members engage in similar if not identical activity; there is no division of labor, and no organization of the activity of several individuals around any material goal or product. The children do not subordinate their individual interests to that of the group, instead, each child acts as he wishes. By his conversation with the other children one can tell that his interest is primarily in his associations, not in his activity. Occasionally, two or three children are engaged in no activity of any duration, but are merely doing whatever happens to draw the attention of any of them.

f. Cooperative or organized supplementary play: The child plays in a group that is organized for the purpose of making some material product, or of striving to attain some competitive goal, or of dramatizing situations of adult and group life, or of playing formal games. There is a marked sense of belonging or of not belonging to the group. The control of the group situation is in the hands of one or two of the members who direct the activity of the others. The goal as well as the method of attaining it necessitates a division of labor, taking of different roles by the various group members, and the organization of activity so that the efforts of one child are supplemented by those of another.

g. Adult-directed behavior: Any behavior directed to an adult by the target child.

h. Other behavior: Target child out of room, transitions, etc.

With regard to coding procedures for the social play rating, the category that best characterized (most time spent) the target child's behavior during the ten-second observation interval was scored. In the case of equal time spent in each category, the more advanced category was scored. Accordingly, only one category was scored during each ten-second observation interval. Also, for parallel play, the initials of the child or children (maximum of two) closest to the target child within the three feet criterion were noted.

2. Constructiveness of play rating: When a target child is playing, it is important to assess the quality or constructiveness of that play. Behavior categories were derived from the work of Lovaas, Koegel, and Simmons (1973), Smilansky (1968), and some of the work described in Singer (1973). Essentially, the following categories were arranged in a developmental sequence, many of which are verbatim definitions from the works referenced above.

> a. Inappropriate play: The child uses toys in a repetitive, mechanical, nonconstructive manner. There is no apparent organized goal in the play activity. Typically, the child would be found spinning objects, banging materials, repetitively placing items in various positions, or otherwise using toys in a nonconstructive manner.
>
> b. Appropriate play--exploration and simple play: Toys or materials are used in an appropriate manner, however, the child is exploring or manipulating objects. The child may show an interest but be unable to use them properly, or may have a lack of experience in their use. For example, the child may be stacking tiles or blocks, scattering things, putting crayons in boxes, handling and examining various toys, pouring water into containers, etc. (Here you must make the distinction between handling or examining and staring or using objects in a bizarre, repetitive, or stereotyped manner.) Also, the child may pile up objects, fit tiles in a pegboard, punch a bobo, ring the telephone, scribble with the crayons, pull a wagon, turn pages in a book, or make a rattle by placing small objects in a larger one. One common element here is that one response accomplishes as much as any series of responses to a given object. One response does not require another one, nor does it depend on a previous one.
>
> c. Appropriate play--constructive play: The constructive category of appropriate play consists of the ap-

propriate use of objects, or participation in games in which there is a definite dependency of one response on another. One response leads to or proceeds from another in the accomplishment of some project or activity. In this category, a number of responses completes some whole which no response individually could complete. Examples include making a pattern or picture with tiles or crayons, building an object with blocks, reading, pulling the wagon to transport objects for a project, setting bowling pins up in the appropriate pattern and knocking them over, and completing a puzzle. Each response here adds something new to the ultimate goal of some project.

d. Appropriate play--pretend play: Categorize here if the target child, in addition to playing constructively as in the preceding category, goes beyond the play materials and organizes complex goal-oriented interrelationships not stimulus-bound or tied to the toy materials directly. This category is designed to reflect high level organized fantasy-type play, usually involving role-playing in a variety of forms.

For the constructiveness categories, the following coding procedures were in effect. If the target child received a social play rating of either solitary, parallel, associative, or cooperative, a categorization of that play into one of the four constructiveness levels was required. Again, only one category per ten-second interval was permitted and in the case of a judgment of equivalence between categories, the developmentally more advanced one was scored.

3. Interaction category--communication: In order to determine the frequency and nature of communicative interactions for the different children, the following categories were selected. Most of these categories were derived from the work of Strain and Timm (1974), and most of the definitions are reproduced below:

a. Positive motor or gestural communication: All deliberate movements that cause a child's head, arms, or feet to come into direct contact with the body of another child; that involve waving or extending arms directly toward another child; or that involve placing of hands directly upon a material, toy, or other movable apparatus that is being touched or manipulated by another child. For positive, this includes a touch with hand or hands, hug, holding hands, kiss, wave, and all cooperative responses involved with sharing a toy or material.

b. Negative motor or gestural communication: All deliberate movements that cause a child's head, arms, or feet to come into direct contact with the body of another child; that involve waving or extending arms directly toward another child; or that involve placing of hands directly upon a material, toy, or other movable apparatus that is being touched or manipulated by another child. For negative, this includes a hit, pinch, kick, butt with head, "nonplaying" push or pull, grabbing object from another child, destroying construction of another child.

c. Positive vocal or verbal communication: All vocalizations produced while target child is directly facing any other child within a radius of one meter or all vocalizations that by virtue of content or circumstance (e.g., proper name, "hey you," response to other child, etc.) and/or accompanying motor-gestural movements (e.g., waving, pointing) clearly indicate that the child is directing the utterance to another child within or beyond a one meter radius. Categorize also if vocalizations are clearly directed toward a group of children within one meter of the target child. Self-verbalizations or other vocalizations without communicative intent are not to be included. For positive, this includes all vocalizations directed to another child including those accompanied by gestures that indicate approval, comments, or requests, but excludes screams, shouts, cries, and whines.

d. Negative vocal or verbal communication: All vocalizations produced while a child is directly facing any other child within a radius of one meter or all vocalizations that by virtue of content (e.g., proper name, "hey you," etc.) and/or accompanying motor-gestural movements (e.g., waving, pointing) clearly indicate that the child is directing the utterance to another child within or beyond a one meter radius. Categorize also if vocalizations are clearly directed toward a group of children within one meter of the target child. Self-verbalizations or other vocalizations without communicative intent are not to be included. For negative, this includes screams, shouts, cries, whines, or other utterances that are accompanied by gestures that indicate rejecting, oppositional behavior.

Coding procedures for this general category were designed to reflect the frequency of occurrence of communicative behaviors per ten-second interval as well as an identification of the child or children to whom the communication was addressed. (If a behavior was directed toward the group, the two peers nearest the target child were identified.) Specifically, the occurrence of any of the four communication categories to any child for each interval was recorded with the following restrictions: although the same behavior (e.g., positive vocal or verbal behavior) could be categorized as having occurred more than once during an interval, in order to be so categorized that behavior must have been addressed to different children. The same behavior addressed to the same child, even though occurring during seemingly different "episodes" during the ten-second interval, was recorded only once. Different communicative behaviors as defined above addressed to the same child, however, were categorized more than once.

4. Interaction category--initiated/responded: In order to determine which children or groups of children initiated communications or responded to the communications of others, the communicative behavior of the target child was classified into either:

a. Initiated: Those behaviors produced at least three seconds before or three seconds after another child's communicative behavior.

b. Responded: Those behaviors produced within three seconds following another child's communicative behavior.

All communicative behaviors were identified as either initiated or responded.

5. Interaction category--parallel play: In order to obtain information as to the characteristics of the children and

their distribution in relation to the target child during parallel play, those children (maximum of two--criterion of proximity) engaging in parallel play nearest the target child were identified and recorded.

B. Behavior of peers to target child

In order to assess the frequency of occurrence and nature of interactions received by children from peers, the communicative behaviors of peers to the target child were also recorded. The categories of positive and negative motor or gestural and positive or negative vocal or verbal behavior as in the target to peer section were used here as well. The same definitions were also in effect.

With regard to the coding of the behaviors, all communicative interactions to the target child were scored. However, behaviors were scored only once if, during the ten-second observation interval, the same behavior by the same peer was observed even if seemingly different "episodes" occurred during the interval. Different communicative behaviors from the same peer to the target child were separately scored. The identity of the peer who communicated with the target child was also recorded.

C. Teacher or adult behavior to target child

Although an estimate of the extent to which a target child interacts with the teacher or other adult was obtained as part of the social play rating (category g), other teacher behaviors are of interest. The following teacher or adult behaviors were defined and recorded:

1. Prompting: This behavior included all physical and

verbal activities by the teacher designed to initiate or maintain social interaction between the target child and peers. Physical prompts included such activities as moving a target child to where other children were playing, moving a child's hands, feet, etc., in such a way that he engaged in some ongoing interaction with peers. Verbal prompts included such comments as, "Let's play with your friends," "You can play with games together," or "Now it's time to play on the slide with Karen." Also included here were teachers' comments to peers in presence of target child requesting all to play together.

2. Positive reinforcement: This included all positive physical and verbal behaviors of the teacher delivered to the target child that immediately followed positive social or play behaviors. A typical teacher reinforcement would be: "I like it when you play with your friends, Hank," or "Good, that's the way to use the garage."

3. Negative reinforcement: Included here were all negative physical and verbal behaviors of the teacher delivered to the target child immediately following negative social or play behaviors. The teacher behaviors were classified as negative if they clearly indicated disapproval or criticism. Comments such as "Stop that" (loud tone), "Don't hit," or "You're breaking it," were included here.

4. Presence of teacher or other adult: Presence was noted if the teacher or other adult were within three feet of target child or involved in the play activity.

Each of the four teacher behaviors could be categorized only once during any observation interval, even if they were provided by different teachers. Consequently, all four or any combination of these behaviors could be observed and recorded during an interval.

Gross-motor play

Those same categories that were selected for free play were used to record children's play interactions during the gross-motor period. However, due to the differences in equipment and the nature of the activity, a number of modifications were made in the category definitions. The fundamental and essential aspects of each category remained unchanged so as to permit meaningful comparisons between free and gross-motor play.

A. Target child's behavior

1. Social play rating

a. Unoccupied behavior: The child apparently is not playing, but occupies himself with watching anything that happens to be of momentary interest. When there is nothing exciting taking place, he plays with his own body, gets on and off chairs, just stands around, follows the teacher, or sits in one spot glancing around the room. A variety of rhythmic, self-stimulatory behaviors not focused around toys or other materials would be included here. Note that the child is not engaged in any gross-motor activities. He is not running, playing with others, or using any of the equipment. (If the child is doing any of the above, then classify as solitary, parallel, associative, or cooperative gross-motor play.)

b. Solitary independent play: The child plays alone and independently with the equipment, or engages in gross-motor play (e.g.,running, jumping), such that his play is different from that of the children within speaking distance and he makes no effort to get close to other children. He pursues his own activity without reference to what others are doing.

c. Onlooker: The child spends most of his time watching the other children play. He often talks to the children whom he is observing, asks questions, or gives suggestions, but does not overtly enter into the play himself. This type differs from unoccupied in that the onlooker is definitely observing particular groups of children rather than anything that happens to be exciting. The child stands or sits within speaking distance of the group so that he can see and hear everything that takes place.

d. Parallel activity: The child plays independently, but the activity he chooses naturally brings him among other children. He plays with equipment that is like those which the children around him are using, but he plays with the equipment as he sees fit, and does not try to influence or modify the activity of the children near him. He may run or jump near other children, but he plays beside rather than with them. There is no attempt to control the coming or going of children in the group. The target child must be within three feet of other children to have play classified as parallel.

e. Associative play: The child plays with other children. The conversation concerns the common activity; there is a sharing of play equipment or joining in a gross-motor activity. Following or chasing one another and sharing equipment in a mutual fashion are examples. Mild attempts to control which children may or may not play in the group are evident. All the members engage in similar if not identical activity; there is no division of labor, and no organization of the activity of several individuals around any material goal or product. The children do not subordinate their individual interests to that of the group, instead, each child acts as he wishes. By his conversation with other children, one can tell that his interest is primarily in his associations, not in his activity. Occasionally, two or three children are engaged in no activity of any duration, but are merely doing whatever happens to draw the attention of any of them.

f. Cooperative or organized supplementary play: The child plays in a group that is organized for the purpose of making some material product, or of striving to attain some competitive goal, or of dramatizing situations of adult and group life, or of playing formal games. This may or may not include the use of the gross-motor equipment. Running, games, tag, etc., are appropriate forms of expression for cooperative play if the other criteria are satisfied as well. There is a marked sense of belonging or of not belonging to the group. The control of the group situation is in the hands of one or two of the members who direct the activity of the others. The goal as well as the method of attaining it necessitates a division of labor, taking of different roles by the various group members, and the organization of activity so that the efforts of one child are suplemented by those of another.

g. Adult-directed behavior: Any behavior directed to an adult by the target child.

h. Other: Target child out of room, transitions, etc.

All coding rules effective for the free-play period are effective here as well.

2. Constructiveness of play rating: The constructiveness scale was modified as indicated below but the same coding procedures as existed for free play were in effect. The category reflecting exploratory and simple play was not able to be reliably differentiated for the use of gross-motor equipment.

a. Inappropriate play: The child uses equipment or toys in a repetitive, mechanical, nonconstructive manner. There is no apparent organized goal in the play activity. Typically, the child would be found spinning objects, banging materials, repetitively placing items in various positions, jumping in a repetitive way, picking at the gross motor equipment, or otherwise using equipment or toys in a nonconstructive manner.

b. Appropriate play--constructive: The constructive category of appropriate play consists of the appropriate use of the equipment or of objects, or participation in games in which there is a definite dependency of one response on another. One response leads to or proceeds from another in the accomplishment of some project or activity. In this category, a number of responses completes some whole which no response individually could complete. Using the apparatus as it is designed, running or jumping or using equipment in an organized way toward a goal is constructive play.

c. Appropriate play--pretend play: Categorize here if child, in addition to playing constructively as in the preceding category, goes beyond the play materials and organizes complex goal-oriented interrelationships not stimulus-bound or tied to the equipment or other materials directly. This category is designed to reflect high level organized fantasy-type play, usually involving role-playing in a variety of forms.

3. Interaction category--communication: Those definitions and coding procedures that were described for free play

were also followed for gross-motor play.

4. Interaction category--initiated/responded: Those definitions and coding procedures that were described for free play were also followed for gross-motor play.

5. Interaction category--parallel play: Those definitions and coding procedures that were described for free play were also followed for gross-motor play.

B. Behavior of peers to target child

Those definitions and coding procedures that were described for free play were also followed for gross-motor play.

C. Teacher or adult behavior to target child

Those definitions and coding procedures that were described for free play were also followed for gross-motor play.

Summary of observations

The basic data for the study were recorded in accordance with the behavior categories described above. In summary, information with regard to the following categories was obtained:

A. Target child's behavior
    1. Social play rating
    2. Constructiveness of play rating
    3. Interaction category--communication
    4. Interaction category--initiated/responded
    5. Interaction category--parallel play
B. Behavior of peers to target child
    1. Interaction category--communication
C. Teacher or adult behavior to target child
    1. Prompting

2. Positive reinforcement
3. Negative reinforcement
4. Presence

For the interaction categories, an identification and recording of the child or children who interacted with the target child was obtained. This permitted not only an analysis of the frequency of interactions but also an analysis of the pattern according to developmental level. The section on the analyses of data discusses the dependent variables, including the various measures derived from these behavior categories.

Reliability

Figure 1 presents the general observation code record sheet that was used throughout the experiment. Each of the 16 intervals represents data derived from a ten-second observation period. Given the complexity of this data collection system, reliability of judgment was determined in a number of different ways.

Insert Figure 1 about here

As indicated by Johnson and Bolstad (1973), it is not only necessary to establish reliability prior to the experiment but also to provide a number of reliability checks during the course of the investigation. After three weeks of preliminary training, all observers consistently reached the minimum criterion of 85% agreement for each of the major behavior categories (see description below). This training also served as an adaptation period for the observers and children. Following the start of the investigation, a series of reliability checks was required at least once per week, with each of the three observers participating in at least four such checks. To obtain an estimate of reliability, pairs of observers simultaneously recorded one target child for a complete four-minute cycle. Selection of target children was made on a random basis, assuring equal numbers of mixed and unmixed as well as free and gross motor reliability assessments.

Reliability was evaluated separately for the social play rating, the constructiveness rating, target child to peers, peers to target child (the latter two being communication categories), and teacher behavior. For the social play rating, since a score was required for each interval, reliability was obtained by calculating the number of agreements, dividing by the total number of observations, and then transforming the score to a percentage. The same procedure was used for the constructiveness scale, although the total number of observations varied with the extent of the child's involvement in play.

For the target child's behavior, two different procedures were adopted in order to achieve the best possible estimates of reliability. First, a cell-by-cell agreement was obtained. Reference to Figure 1 will reveal that there are 48 cells which relate to the target child's behaviors; 16 for motor or gestural behavior, 16 for vocal or verbal behavior, and 16 for modeling or physical guidance (this last category was eliminated from the analysis since those behaviors did not occur with sufficient frequency). As described in the section on behavior categories, each cell could contain a variety of different information. Specifically, if a motor-gestural communication was made, the child to whom the communication was directed was identified, as well as whether the communication was positive or negative, and whether it was initiated or responded. In order for a cell to be considered as an agreement between two observers, all elements in that cell, including type of communication, identified children, and whether the communication was initiated or responded, must be identical. If no communicative behaviors occurred, an agreement of nonoccurrence would result. Reliability was calculated by taking the total number of agreements, dividing by 48, and transforming to a percentage.

A second, more stringent method for obtaining reliability was obtained by using the frequency of observations as the unit of analysis rather than cell-by-cell agreement. Specifically, calculations were based on the number of agreements and disagreements as one moved from cell-to-cell. Comparing data sheets for a given cell, beginning with a child or children recorded in that cell, an agreement score of one (1) was obtained if the same child was noted by both, (score two (2) if the same two children were noted by both, and score one agreement and one disagreement if two children were scored but only one in common). Following agreement by children, agreement with regard to the positivity or negativity of the communication as well as whether it was initiated or responded was determined. This analysis was completed only for children in common and each agreement or disagreement scored one. An agreement of nonoccurrence in a cell was similarly scored one. Reliability was calculated by dividing the total number of agreements by the total number of agreements plus disagreements and transforming to a percentage. The net effect of this procedure was to reduce the contribution of agreement of nonoccurrences to the reliability score. Although agreement that no interactions occurred is important, substantial amounts of no interactions could obscure problems in reliability when interactions were occurring. The same two reliability procedures, cell-by-cell and observation frequency, were used for peers to target as well as for target to peers.

Similarly, for teacher behavior, both methods were used. In this case, a maximum of four observations could occur per cell, one each for prompting, positive reinforcement, negative reinforcement, and teacher presence.

Table 3 presents a summary of reliability for each of the categories noted above for pre and post testing. Using ratings obtained each week as the base, it can be seen that reliability was consistently high in all instances, especially agreement in the target to peers category. Agreement as to identified children playing in parallel to the target child exceeded 85%.

Insert Table 3 about here

Analyses of the Data

The information obtained for each of the four ratings per child per condition was cumulated and formed the basis for the statistical analyses. Through a series of stepwise operations the data were categorized and tabulated in a form to permit the

TABLE 3

Summary of Reliability for Each Category during Pre and Post Testing[1]

Condition	Social Play	Constructiveness	Target to Peers		Peers to Target		Teacher Behavior	
			Cell-by-Cell	Observ. Freq.	Cell-by-Cell	Observ. Freq.	Cell-by-Cell	Observ. Freq.
PRE								
Mean	91.9	93.0	97.3	97.4	95.8	96.8	91.5	91.2
Range	88.2-97	84.2-98.7	95.4-99.6	91.7-99.6	93.8-97.6	95.2-98	89.2-95.2	85.5-95.2
POST								
Mean	90.3	96.3	96.7	97.3	96.3	93.6	93.4	94.3
Range	84.4-96.2	93.8-100	96.2-97.9	96.3-98.3	93.7-97.7	81-98.9	91.7-95.8	92-96.6

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[1] All data are based on percentages.

analyses described below. A number of dependent variables were derived from the basic data as well.

Free play

Social play: Since there were eight related categories for the social play variable, a 2 (mixed vs. unmixed) x 2 (pre vs. post) x 4 (developmental levels (DLs)) multivariate analysis of variance (MANOVA) was carried out (see Feild & Armenakis, 1974; Hummel & Sligo, 1971; McCall & Appelbaum, 1973). As noted, the data for the analysis consisted of the sum total of the four ratings for a given category for each child per condition. For technical reasons data were analyzed as if all factors included nonrepeated measures, although the only between factor was DL. It is important to recognize that this yielded a more conservative test.[8] Following standard procedures, if the multivariate test was significant, a series of univariate tests were carried out for that variable.

Constructiveness of play: For the constructiveness scale, a unitary score for each child per condition was derived by assigning the following ordinal values (ordered developmentally): inappropriate play (1); appropriate play--exploration and simple play (2); appropriate play--constructive play (3); and appropriate play--pretend play (4). Each time a particular level of play occurred, the relevant number was assigned and a mean constructiveness score, ranging from 1 to 4, for each child per condition was derived and formed the unit of analysis. A 2 (mixed vs. unmixed) x 2 (pre vs. post) x 4 (DL) mixed ANOVA was carried out (repeated measures on composition and time factor, nonrepeated on DL).

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[8] In some instances, a multivariate analysis of variance was carried out separately on the pre scores and a multivariate analysis of covariance (MANCOVA) on the post with the pre scores as covariates.

Teacher behavior: A third major question concerned the possible effects of the different variables on teacher behavior. Since there were four dependent variables for this category, a multivariate analysis on the frequency of occurrence of each of the dependent measures identical to the one for the social play category was carried out.

Communication: The next analysis evaluated the effects of the independent variables on the measures of communication. This analysis was divided into two main categories referred to as (1) giving and (2) receiving. Communication referred to as "giving" consisted of the sum total of communicative interactions provided by a target child to other children. Similarly, "receiving" consisted of interactions of peers communicating with a target child. Two separate analyses, one for giving and one for receiving, were carried out for the following four dependent variables constituting the communication category: (1) positive vocal or verbal behavior (V-V), (2) negative V-V, (3) positive motor or gestural behavior (M-G), and (4) negative M-G. In addition, separate giving and receiving analyses were carried out for total scores consisting of total positive behavior (positive M-G plus V-V) and total negative behavior (negative M-G plus V-V). A multivariate analyses of variance were carried out for the group of four dependent variables for giving and receiving. For this group, MANOVAs on the pre test and MANCOVAs on the post with the pre scores as covariates were carried out. For the two totals, separate 2 x 2 x 4 ANOVAs were carried out.

Proportion initiated: Related to this was the analysis of the proportion of communications that were initiated as a function of the major independent variables. A proportion initiated score was derived from the positive interactions of the giving data only obtained from both those occasions when the child was the target as well as those observations obtained from record sheets when other children were the targets. This was obtained by summing all initiated and responded scores across all occasions and across all children to whom communications were addressed, and dividing the number initiated by the total number of interactions. Analyses regarding the proportion initiated by each DL group to other DL groups in the mixed condition revealed inconsistent and somewhat spurious effects, in part due to the low frequency of communications relating to the less advanced children. Accordingly, no further details are presented.

Interaction measures--communication and parallel play: Looking at mixed play only, it was essential to determine the nature and extent to which children at different developmental levels interacted with one another. To accomplish this it was necessary to compare the frequency of communicative interactions of each DL group to all other DL groups. In order to correct for the fact that the number of children available to interact with the four developmental level groups differed, a derived score was obtained for each child interacting with a DL group. These scores were obtained and analyzed separately for giving and receiving and separately for positive V-V, positive M-G, and positive totals (negative interactions occurred with such a low frequency to preclude a meaningful calculation of derived scores).

Specifically, the score for a particular child was obtained by taking the total interactions of that child (e.g., positive V-V for the receiving dimension) and calculating an "expected" interaction score for each DL group based on the number of children available in each with whom that child could interact. For example, if 25% of the children at a given time were NH children and a child had a total of 100 positive V-Vs, then we would expect 25 positive V-Vs to be addressed to the NH group on the basis of availability. Accordingly, derived scores were obtained by subtracting the expected scores from the observed scores for each child. A positive score reveals a preference for interacting with that group, a derived score of 0 indicates that interactions occurred to the degree expected due to the availability of children without regard for any other characteristics, and a negative score indicates interactions occurring at a level lower than would be expected from the availability of children. The proportions used to calculate expected scores were corrected for absences and other relevant factors.

In this way, the expectancy score reflects the number of interactions to each DL group, including the child's own group, that would be expected for a given child assuming that interactions were determined strictly on the availability of children (i.e., the numbers for DL group). To the extent that the observed number of interactions differed from those expected on the basis of availability alone, a preference toward one group or another would be evident.

The derived scores were then subjected to separate 2 (pre vs. post) x 4 (DL) x 4 (DL group interacted with) mixed measures ANOVAs for each dependent variable.

Precisely, the same procedure for obtaining derived scores and their analysis was followed for an interaction analysis of parallel play (ANOVA).

Gross motor play

Although there were a number of structural differences between the mixed free play, and gross-motor play periods (e.g., all children participated in the gross-motor play simultaneously whereas the children were divided into two groups for mixed free play), comparisons were nevertheless made between these two conditions. In addition, since gross-motor play was always a mixed condition, interaction analyses (for communication and parallel play) identical to those described for the mixed condition of the free-play period were carried out.

In general, the gross-motor scores replaced the scores for the group composition variable (mixed vs. unmixed) in the previous analyses. Accordingly, the same analyses as described earlier for free play were carried out.

Social play: A 2 (mixed free play (MFP) vs. gross-motor play (GMP)) x 2 (pre vs. post) x 4 (DLs) MANOVA was conducted for the eight social play categories.

Constructiveness of play: The analysis consisted of a 2 (MFP vs. GMP) x 2 (pre vs. post) x 4 (DLs) mixed ANOVA for the constructiveness scores.

Teacher behavior: For the four teacher behavior categories, a 2 (MFP vs. GMP) x 2 (pre vs. post) x 4 (DL) MANOVA was carried out.

Communication: For the giving and receiving scores obtained only when a particular child was a target, separate analyses for these dimensions and for the two groupings of the communication categories (1) positive M-G, negative M-G, positive V-V, negative V-V, and (2) total positive, total negative, were carried out. For the first grouping of four variables, a MANOVA on the pre and a MANCOVA on the post test were performed. For the total scores, separate 2 (MFP vs. GMP) x 2 (pre vs. post) x 4 (DLS) ANOVAs were carried out.

Proportion initiated: Proportion initiated scores yielded similar results as in the free play condition and are not discussed further.

Interaction measures--communication and parallel play: Looking only at gross-motor play, derived scores were obtained in a manner identical to that described for free play and the same analyses conducted. Comparisons between MFP and GMP were not carried out.

Summary of dependent measures

In summary, the following dependent variables were selected for analysis.

Free play

1. Social play--8 categories
2. Constructiveness of play
3. Teacher behavior--prompts, presence, positive reinforcement, negative reinforcement
4. Communication
    a. Giving--positive V-V and M-G, negative V-V and M-G, and total positive and total negative
    b. Receiving--positive V-V and M-G, negative V-V and M-G, and total positive and total negative

5. Proportion initiated
6. Interaction--communication
    a. Derived scores--Giving: positive V-V, positive M-G, and total positive
    b. Derived scores--Receiving: positive V-V, positive M-G, and total positive
7. Interaction--parallel play (derived score)

For each dependent variable the effects of time (pre vs. post), group composition (mixed vs. unmixed), and the four developmental levels were assessed. In addition, as discussed in the results section, other subsidiary analyses were carried out as specific questions arose.

Gross motor play

1. Social play--8 categories
2. Constructiveness of play
3. Teacher behavior--prompts, presence, positive reinforcement, negative reinforcement
4. Communication
    a. Giving--positive V-V and M-G, negative V-V and M-G, and total positive and total negative
    b. Receiving--positive V-V and M-G, negative V-V and M-G, and total positive and total negative
5. Proportion initiated
6. Interaction--communication
    a. Derived scores--Giving: positive V-V, positive M-G, and total positive
    b. Derived score--Receiving: positive V-V, positive M-G, and total positive.
7. Interaction--parallel play (derived score)

For each dependent variable the effects of time (pre vs. post), the four developmental levels, and setting (gross motor play vs. mixed free play) were assessed. In addition, as discussed in the results section, other subsidiary analyses were carried out as specific questions arose.

Results

Free Play

Social Play

A 2 x 2 x 4 MANOVA carried out on the eight dependent variables revealed a significant multivariate effect only for DL (F (24,363) = 7.373, $p < .001$). A series of univariate tests indicated significant effects for unoccupied (F (3,132) = 30.39, $p < .001$), solitary (F (3,132) = 2.91 $p < .037$), onlooker (F (3,132) = 8.20 $p < .001$), associative (F (3,132) = 27.49, $p < .001$), and cooperative play (F (3,132) = 5.60 $p < .001$). As noted, no other significant effects or interactions were detected although the multivariate test for the pre - post variable did approach significance ($p < .067$).

Figures 1-8 illustrate the differences quite clearly, with the data reflecting the percentage of cells (time) the children were engaged in that level of play. For all groups, parallel play was the dominant mode, with the less advanced children engaging in more unoccupied and solitary play, but less onlooker, associative, and cooperative play. Comparison of figures 1-4 and 5-8 (pre vs. post) reveal little evidence of change across time, although there was an overall tendency for solitary play to decrease and cooperative play to increase. Of perhaps most interest, however, is the similarity of play for all groups during mixed and unmixed play. Accordingly, the group composition factor had virtually no impact on social play.

Insert Figures 1-8 about here

Constructiveness of play

A 2 x 2 x 4 mixed measures ANOVA was carried out on the constructiveness score. Significant main effects for DL (F (3,33) = 24.48, $p < .001$) and time (F (1,33) = 17.81, $p < .001$) were noted. As expected, more advanced children played more constructively and the constructiveness of play increased over time. In addition, although the group composition factor was not significant, the group composition by DL interaction did reach significance (F (3,33) = 4.02, $p < .025$). Inspection of Figure 9 reveals that for the post condition, severely and moderately handicapped children tended to play more constructively under mixed conditions than under unmixed, but mildly and nonhandicapped children tended to play more constructively under unmixed compared to mixed conditions. However, applying the Newman-Keuls test it was revealed that the only significant mixed-unmixed effect was for the severe group ($p < .05$).

Teacher behavior

A 2 x 2 x 4 MANOVA for the four teacher behaviors revealed a significant effect for DL (F (12,324) = 4.63, $p < .001$). Univariate tests indicated significant effects for prompts (F (3,132) = 6.90, $p < .001$), positive reinforcement (F (3,132) = 9.42, $p < .001$), and negative reinforcement (F (3,132) = 3.74, $p < .013$). The multivariate test for time was also significant (F (4,129) = 4.08, $p < .004$) with only the negative reinforcement variable significant for the univariate tests (F (1,132) = 13.30, $p < .001$). The group composition factor did not reach significance nor did any of the interactions.

In general, as illustrated in Figures 11 and 12, teachers tended to provide more prompts and more positive reinforcement to the less advanced children. However, the absolute differences are rather small. Similarly, although the negative reinforcement variable was significant for both time and DL, the very low frequency of occurrence of such events suggests that the results are spurious and preclude a meaningful interpretation (see Figure 13). As noted in Figure 14, although there was a tendency for teachers to be present more often with moderately handicapped children during post conditions, this was not a significant difference.

Insert Figures 11-14 about here

Communication

Giving: A 2 (mixed-unmixed) x 4 (DL) MANOVA carried out on the pre test scores revealed a significant multivariate effect for DL (F (12,167) = 6.05, $p < .001$) and significant univariate tests for positive M-G(F (3,66) = 21.72, $p < .001$), positive V-V (F (3,66) = 18.73, $p < .001$), and negative V-V (F (3,66) = 5.25, $p < .013$). No other effects were significant.

For the MANCOVA on the post, the multivariate DL was also significant (F (12,156) = 2.55, $p < .004$) with two univariate tests reaching significance: positive V-V (F (3,62) = 4.00, $p < .011$), and negative V-V (F (3,62) = 4.47, $p < .007$).

For the 2 x 2 x 4 mixed measures ANOVA carried out on the total positive scores, significant effects for DL (F (3,33) = 22.26, $p < .001$) and time (F (1,33) = 16.33, $p < .001$) were obtained. No other effects were significant. For total negative scores, the only significant effect was for time (F (1,33) = 5.31, $p < .05$).

Reference to Figures 15 and 16 will reveal the existence of a substantial difference in the frequency of positive communications among the DL groups for M-G and V-V. The significant MANCOVA on the post further suggests that the difference obtained during the pre test increased even more on the post test. Furthermore, the significant pre - post result for the ANOVA on the total positives revealed that the frequency of positive communications increased with time (see Figure 19).

Given the very low incidence of negative communications by any group (see Figures 17, 18, and 20), an interpretation of those results is very difficult. However, it is most reasonable to suggest that negative communications varied little across DL groups and had little differential impact.

Insert Figures 15-20 about here

Receiving: A 2 x 4 MANOVA on the pre test for the four dependent variables for receiving indicated a significant multivariate effect for DL (F (12,167) = 5.85, $p < .001$) and significant univariate tests for positive M-G (F (3,66) = 17.55, $p < .001$) and for positive V-V (F (3,66) = 18.12, $p < .001$). No other effects were significant.

For the MANCOVA on the post, again the only multivariate effect that was significant was for DL (F (12,156) = 2.08, $p < .021$) with significant univariate tests for positive V-V (F (3,62) = 4.74, $p < .005$) and negative M-G (F (3,62) = 3.78, $p < .015$).

For the 2 x 2 x 4 ANOVA carried out on the total positive scores, significant effects for DL (F (3,33) = 23.41, $p < .001$) and for time (F (1,33) = 22.49, $p < .001$) were obtained. No other effects were significant. Fof total negative communications, only the time factor was significant (F (1,33) = 5.08, $p < .05$).

Figures 21,22, and 25 indicate that results similar to those for the giving dimension were obtained. As revealed by the statistical analyses, the different DL groups differed in terms of positive M-G on the pre test and maintained that difference on the post test. For positive V-V, however, the differences on the pre increased even more on the post. The significant total positive communications effect for DL further supported these findings as did the findings that the total positive communications increased over time (see Figure 25).

Once again, the low incidence of negative communications precludes any meaningful interpretation. Of great importance, however, it should be noted that the group composition factor did not have any impact on any of the communication variables under any condition.

Insert Figures 21-26 about here

Interaction measures--communication

Derived scores were obtained reflecting the distribution of interactions among the various DL groups. As described earlier, a positive score indicates that that DL group was interacting to a larger extent than expected based on the availability of children in the group, a negative score indicates less frequent interactions, and a zero score indicates no discrepancy between expected and observed interactions. Since negative communications occurred with such a low frequency, only the positive communications were subjected to the interaction analyses (M-G, V-V, and total). Separate analyses, however, were carried out for giving and receiving. In all instances, 2 (pre vs. post) x 4 (DL within-to whom communicated) x 4 (DL) mixed measure ANOVAs were carried out. The main effect for DL is not relevant since it averages to zero given the nature of the derived score. Interactions including DL are of interest, however.

Giving: For positive MG significant main effects were obtained for DL (within), $F(3,99) = 15.80$, $p < .001$ and time, $F(1,33) = 13.77$, $p < .001$. The only significant interaction was between DL and DL (within), $F(9,99) = 3.77$, $p < .001$. For positive V-V, a DL (within) effect was also obtained, $F(3,99) = 22.51$, $p < .001$, but no other main effects were significant. However, two interactions did reach significance, DL (within) x DL, $F(9,99) = 6.50$, $p < .001$, and time x DL (within), $F(3,99) = 2.89$, $p < .05$. The analysis of total positive giving communications also revealed only two significant effects: DL (within), F (3,99) = 22.30, $p < .001$ and the DL (within) x DL interaction, F (9,99) = 6.13, $p < .001$.

Receiving: The analysis for receiving produced somewhat more complex results. For positive M-G significant main effects for DL (within), F (3,99) = 25.21, $p < .001$, and time, F (1,33) = 5.98, $p < .025$ were obtained. In addition, a significant DL x DL (within) effect was also noted, F (9,99 = 3.97, $p < .001$. For V-V, significant main effects for DL (within), F (3,99) = 38.84, $p < .001$, and time, F (1,33) = 420.00, $p < .001$, were obtained. In addition, a number of interactions also reached significance: DL x DL (within), F (9,99) = 7.55, $p < .001$, time x DL (within), F (3,99) = 4.74, $p < .01$, time x DL, F (1,33) = 176.00, $p < .001$, and DL x DL (within) x time, F (9,99) = 2.26, $p < .05$. The analysis of total positive communications revealed significant main effects for DL (within), F (3,99) = 40.07, $p < .001$ and time, F (1,33) = 4.75, $p < .05$. The DL x DL (within) interaction also reached significance, F (9,99)= 7.24, $p < .001$.

Figures 27-50 illustrate these results in detail. Each graph presents the data for both giving and receiving, for a particular time period, for a given developmental level group, and for one of the three positive communicative responses (M-G, V-V, or total). Looking at the giving data, significant effects resulted for the DL (within) factor and for the DL x DL (within) interaction for all three dependent variables. Inspection of the figures clearly reveals this pattern. The different developmental groups were communicated with differently for some of the developmental groups but not by others. The most apparent pattern is that the NH and Mi groups communicated with each other significantly more than expected by their availability, and considerably less with Mo and S children. Moderately and severely handicapped children, on the other hand, communicated with all groups according to their availability.

As can be seen, the receiving data revealed a similar pattern. The nonhandicapped and mildly handicapped groups received more communications from each other than expected by a criterion of availability and less than expected by the same criterion from moderately and severely handicapped children. Once again, however, the children in the moderately and severely handicapped groups received communications from the different developmental groups in proportion to their availability.

This overall pattern was the most dominant feature of the results. There was some variation across time, although the basic pattern was usually enhanced. In addition, there were interactions between time and DL (within) for the V-V variables. The only dramatic departure from the pattern during post testing, however, was observed for the mildly handicapped children. Specifically, over time, the mildly handicapped children reduced their interactions with severely handicapped children and markedly increased their interactions with the nonhandicapped children (see Figures 36 and 41). Similarly, but to a lesser extent, the nonhandicapped children reduced their interactions with the severely handicapped children and increased interactions with their mildly handicapped peers.

Insert Figures 27-50 about here

Interaction measures--parallel play

The 2 x 2 x 4 mixed measures ANOVA carried out on the derived scores for parallel play revealed a significant main effect for DL (within), F (3,99) = 7.24, $p < .001$, and a significant DL x DL (within) interaction, F (9,99) = 3.36, $p < .005$. Although some similarities to the communication interaction pattern can be noted, there was considerable variability here and less of a tendency for parallel play interactions to be drawn along developmental lines. The NH and Mi children did engage in less parallel play with the severely handicapped children than expected by availability, although there was considerable interaction with the moderately handicapped children. Note, however, that (see Figure 51) the NH children interacted somewhat more with moderately handicapped children during parallel play than expected by the criterion of availability (see also Figure 54 for the severe group).

Insert Figures 51-54 about here

Gross-Motor Play

Essentially the same analyses for free play were carried out for gross-motor play. Instead of comparing mixed versus unmixed play, the comparison between mixed free play and gross-motor play was substituted. It is important to note that these comparisons (e.g., level of social and/or mixed free vs. gross-motor play) must be viewed with caution since gross-motor and free play differed in terms of the time of day and setting in which they occurred and, more importantly, gross-motor play included all children playing simultaneously. Accordingly, these comparisons are presented for their value in suggesting future directions. The interaction data, however, do provide meaningful and useful data regarding interactions among children at different developmental levels during gross-motor play activities.

Social play

A 2 (pre vs. post) x 2 (mixed vs. gross-motor) x 4 (DL) MANOVA was carried out on the eight dependent variables. Significant multivariate effects for DL (F (24,363) = 6.69, $p < .001$), composition--(free vs. gross-motor play)--(F (8,125) = 28.81, $p < .001$), time (F (8,125) = 3.60, $p < .001$) and the DL x composition interaction (F (24,363) = 1.56, $p < .047$) were obtained.

For the DL factor, univariate tests (DF = 1,132) revealed significant differences for unoccupied (F = 30.53, $p < .001$), solitary (F = 3.31, $p < .022$), onlooker (F = 3.75, $p < .013$), associative (F = 28.07, $p < .001$), and cooperative (F = 12.83, $p < .001$) play. The less advanced children engaged in more unoccupied and solitary play, and somewhat less onlooker behavior and parallel play than their advanced peers. In addition, considerably more associative and cooperative play were exhibited by the more advanced children (see Figures 55-62).

These differences for DL have some pragmatic value, but the most interesting findings involve the composition factor. Univariate tests revealed significant effects (DF = 1,132) for unoccupied (F = 6.25, $p < .014$), solitary (F = 10.38, $p < .002$), onlooker (F = 11.75, $p < .001$), parallel (F = 188.52, $p < .001$), associative ($F = 74.08$, $p < .001$), and other ($F = 7.12$, $p < .009$) play categories. More unoccupied, solitary, onlooker, other, and associative play occurred during gross-motor as compared to free play. Mixed play, however, was dominated by parallel play.

The DL x composition interaction revealed a significant univariate effect for associative play ($F(3,132) = 6.06$, $p < .001$). Inspection of Figures 55-62 illustrates that substantial differences for the NH and moderate groups occurred, but this effect was less for the other DL groups.

Also of note, cooperative play ($F(1,132) = 12.97$, $p < .001$) increased from pre to post testing.

Insert Figures 55-62 about here

Constructiveness of play

A 2 x 2 x 4 mixed measures ANOVA was carried out on the constructiveness scores. Significant main effects for DL ($F(3,33) = 20.67$, $p < .001$), time ($F(1,33) = 9.11$, $p < .005$), and composition ($F(1,33) = 32.03$, $p < .001$) were obtained. In addition, significant composition x DL ($F(3,33) = 10.74$, $p < .001$) and composition x time effects ($F(1,33) = 6.35$, $p < .025$ were also found.

Figure 63 illustrates these findings and reveals the complexity of relationships for this variable. Overall, the more advanced children played more constructively, but this effect was minimal for gross-motor play. For the less advanced children, play was more constructive during gross-motor than mixed free play. Please note that for gross-motor constructive play, a modification of the scale was used (see Method section) and it is possible that this may have affected the findings.

Insert Figure 63 about here

Teacher behavior

The 2 x 2 x 4 MANOVA revealed significant multivariate main effects for each of the variables: DL (F (12,342) = 3.75, $p < .001$), composition (F (4,129) = 43.31, $p < .001$), and time (F (4,129) = 3.97, $p < .004$) but no significant interactions.

Univariate tests for DL revealed significant effects for prompts (F (3,132) = 5.74, $p < .001$) and positive reinforcement (F (3,132) = 8.83, $p < .001$). As can be seen in Figures 65 and 66, fewer prompts and positive reinforcements were provided by teachers to the more advanced children.

With regard to mixed free play compared to gross-motor play, univariate tests revealed significant effects for presence (F (1,132) = 171.31, $p < .001$), prompts (F (1,132) = 10.29, $p < .001$), and positive reinforcement (F (1,132) = 4.06, $p < .046$). Reference to Figures 64, 65, and 66 indicates that, overall, teachers were present more, gave more positive reinforcements, and prompted children more during free play as compared to gross-motor play. Interestingly, the level of social play and constructiveness appeared to be higher during gross-motor play than mixed play, yet teachers interacted to a lesser degree. The most likely explanation is that the setting for the gross-motor play prompted better interactions among children, requiring less interaction on their part. The causal relationship here requires further study.

Finally, univariate tests for the time factor revealed significant effects for prompts (F (1,132) = 4.33, p <.039) and negative reinforcement (F (1,132) = 6.36, p <.013). However, on an absolute scale these effects were minor, especially for negative reinforcement.

Insert Figures 64-67 about here

Communication

Giving: A 2 (free vs. gross-motor) x 4 (DL) MANOVA was carried out on the pre-test scores for positive M-G and V-V and negative M-G and V-V. Significant multivariate effects were found for DL (F (12,167) = 4.38, p <.001) and composition (F (4,63) = 19.12, p <.001) only. Univariate tests for DL indicated significant effects for positive M-G (F (3,66) = 12.60, p<.001) and positive V-V (F (3,66) = 15.03, p <.001). Figures 68 and 70 indicate that the frequency of positive communication increased with increase in developmental level.

For the composition factor, a significant univariate effect for positive M-G (F (1,66) = 78.47, p <.001) clearly revealed that motor and gestural communications were substantially higher during gross-motor play (see Figure 65). Note, however, that there is no change for vocal or verbal behavior.

The MANCOVA carried out on post test scores with pre-test scores as the covariate also revealed significant multivariate effects for DL (F (12,156) = 3.74, $p < .001$) and composition (F (4,59) = 3.39, $p < .015$). Univariate tests for all four dependent variables for DL were significant: positive M-G (F (3,62) = 3.16, $p < .015$), negative M-G (F (3,62) = 7.74, $p < .001$), positive V-V (F (3,62) = 7.71, $p < .001$), and negative V-V (F (3,62) = 2.84, $p < .045$). Accordingly, increases in communication occurred in the post test that are not attributable to the differences found on the pre test. Similarly, univariate tests for composition revealed significant effects for positive M-G (F (1,62) = 4.38, $p < .04$) and negative M-G (F (1,62) = 5.15, $p < .025$). Again, changes in these variables occurred over and beyond differences that existed during pre testing.

For the total positive and negative scores, 2 x 2 x 4 mixed measures ANOVAs were carried out. For positive communications, significant effects for DL (F (3,33) = 21.24, $p < .001$), composition (F (1,33) = 79.37, $p < .001$), composition x time interaction (F (1,33) = 7.55, $p < .025$), and composition x DL (F (3,33) = 4.32, $p < .025$) were found. For total negative communications, a significant effect for DL (F (3,33) = 4.18, $p < .025$) only was obtained. Figure 72 indicates that overall negative communications increased from S to Mo groups, but then decreased. For total negative communications, however, the frequency tended to increase directly with the developmental level of the children.

The univariate test for composition indicated a significant effect for total positive communications (F(1,132)=56.01, $p < .001$) but a significant composition x time interaction (F(1,132)=6.83, $p < .010$) as well. Figure 73 indicates that gross-motor play generated more positive communications than free play but that this effect was not uniform over time.

Insert Figures 68-73 about here

Receiving: The 2 x 4 MANOVA carried out on the pre test scores for the four fundamental dependent variables revealed significant multivariate effects for DL (F (12,167) = 4.23, $p < .001$) and composition (F (4,63) = 16.99, $p < .001$). Significant univariate effects for DL were found for positive M-G (F (3,66) = 10.18, $p < .001$) and positive V-V (F (3,66) = 15.90, $p < .001$). Figure 74 indicates that the frequency of positive communications increased directly with the developmental level of the child.

For the composition factor the only significant univariate effect was for positive M-G (F (1,66) = 59.00, $p < .001$) again indicating that more motor-gestural communications occurred during gross-motor play than free play but that vocal verbal interactions remained unchanged.

The MANCOVA on the post test scores revealed significant effects for DL (F (12,156) = 1.89, $p < .039$) and composition (F (4,59) = 7.35, $p < .001$). For the DL variable the positive V-V factor was significant (F (3,62) = 3.86, $p < .013$) indicating that changes occurred on the post test that were beyond those that existed during pre testing. Similarly, the positive M-G communication category for composition was also found to be significant on the univariate test (F (1,62) = 12.63, $p < .001$), again indicating effects beyond the original pre test.

For the total positive scores the 2 x 2 x 4 mixed measures ANOVA, revealed significant effects for DL (F (3,33) = 17.30, $p < .001$), and composition (F (1,33) = 52.06, $p < .001$). In addition, a composition x time interaction (F (1,33) = 13.47, $p < .001$) was obtained. Figure 78 indicates that more positive communications were received by the more advanced groups and that more positive communications were received during gross-motor play. However, more communications occurred during the pre than the post period for gross-motor play, but this was reversed for free play with more communications being received during the post period.

For total negative communications only the time factor was significant (F (1,33) = 8.02, $p < .01$) but again the incidence was very low (see Figure 79).

Insert Figures 74-79 about here

Interaction measures--communication

The 2 (pre vs. post) x 4 (DL--to whom communicated) x 4 (DL) ANOVAs for derived scores described in the corresponding section for free play were carried out for gross-motor play. Once again, separate analyses were carried out for positive M-G, positive V-V, and total positive derived scores and for giving and receiving.

Giving: A significant main effect for DL (within) (F (3,99) = 26.21, $p < .001$) and a significant interaction between DL (within) and DL (F (9,99) = 12.01, $p < .001$) were obtained for positive M-G. In addition, the triple interaction was significant (F (9,99) = 2.29, $p < .05$).

The analysis of V-V yielded a similar result. Both DL (within) (F (3,99) = 27.85, $p < .001$) and the DL (within) x DL interaction were significant (F (9,99) = 9.54, $p < .001$). In addition, for V-V, significant changes over time were noted (F (1,33) = 56.22, $p < .001$).

The analysis conducted on the total positive score produced only a significant DL (within) (F (3,99) = 30.93, $p < .001$) and a significant DL (within) x DL (F (3,99) = 12.20, $p < .001$).

Receiving: For M-G, a significant DL (within) (F (3,99) = 30.60, $p < .001$) effect and a significant time x DL (within) interaction (F (3,99) = 2.79, $p < .05$) were obtained. For V-V, similar results were obtained, i.e., a significant DL (within) (F (3,99) = 60.26, $p < .001$) and significant time x DL (within) (F (3,99) = 3.05, $p < .05$). In addition, the DL (within) x DL interaction produced a significant effect (F (9,99) = 16.95, $p < .001$).

Analysis of the total positive receiving scores resulted in a repetition of the general pattern in which significant effects for DL (within) (F (3,99) = 42.47, $p < .001$), DL (within) x DL (F (9,99) = 14.26, $p < .001$) and time x DL (within) (F (3,99) = 61.98, $p < .001$) were obtained.

Figures 80-103 illustrate the patterns that emerged. As in the case of mixed free play, the most obvious result was that NH and Mi children communicated more and received more communications from each other than expected on the criterion of availability, and communicated less frequently with Mo and S children than expected by the same criterion. On the other hand, S and Mo children did not interact more frequently than expected with any of the DL groups.

Although there was some variation in this pattern, such as the fact that this tendency was not marked for the Mi children (in fact for Mi interacting with other Mi children, there was a slight reversal for positive communication during the post period; see Figures 91, 93, and 101), the overall pattern was evident. This pattern also obtained for both giving and receiving. In contrast to the mixed free play data in which these patterns tended to be enhanced from pre to post testing, with certain minor exceptions, no such trend was evident for gross-motor play interactions.

Insert Figures 80-103 about here

Interaction measures--parallel play

The 2 x 2 x 4 ANOVA carried out on the derived scores for parallel play produced a somewhat different pattern. However, although no DL (within) or time main effects were significant, significant DL (within) x DL ($F(9,99) = 3.69$, $p < .001$) and the DL (within) x time ($F(3,99) = 3.45$, $p < .025$) interactions were obtained.

The DL (within) x DL interaction reflects the fact that different DL groups revealed different parallel play interaction patterns in playing with the four groups. In many respects this finding was similar to those found for communicative interactions. Nonhandicapped and Mi children tended to engage in parallel play more with each other than expected by the criterion of availability, and less with the S and Mo groups. The Mo group tended to show little discrimination but the severely handicapped children engaged in more parallel play with S and Mo children and less with NH and Mi according to the availability criterion. The overall lack of a significant DL (within) effect reflects not only the variability that is part of the parallel play data but also the fact that the magnitude of the difference is considerably smaller. Note that in Figures 104-107, the scale values of the ordinate are much less than those for the communication interaction categories or even parallel play during mixed free play.

Although the pre-post differences for S and Mo groups were minimal, the time x DL (within) interaction primarily reflected the fact that the DL (within) effect for the NH and Mi groups was minimal during pre testing but evident during post testing (see Figures 104 and 105).

Insert Figures 104-107 about here

Discussion

The purpose of this discussion is to present a relatively broad picture of the outcomes of this study and to relate them to the critical questions raised in the introductory sections of this report. No attempt will be made to analyze the implications of every variation and every significant interaction. Rather, as noted, the approach will consist of a search for major patterns that occur reliably and are of sufficient magnitude to indicate a potential for developmental significance.

The reasons for this are manifold but relate primarily to the fact that, as discussed in the review of the literature, very little sound empirical data are available that address the issues focused on in this report. Consequently, a framework to interpret many of the findings, especially the more subtle ones, does not exist. For the most part, without this perspective, it is not possible to obtain an assessment of the extent to which these findings are generalizable beyond the context and conditions existing in this study. In those instances where a comparative data base is available, it is, of course, utilized. Overall, a meaningful interpretation of the results can be expected if the occurrence of strong, persistent, and reliable patterns of behavior remain the focus of attention.

Focusing on free play, as described in the Results section, children's social play, constructiveness of play, and frequency of communications, (as well as certain teacher behaviors), varied as a function of the group's developmental level and time in the expected directions. In general, more advanced children engaged in higher levels of play, played more constructively, communicated more and received more communications from other children, but received fewer prompts and reinforcements from teachers. Many of these effects varied over time as well. However, the group composition variable had only limited impact. With the one exception of the constructiveness of play measure, neither suppression nor enhancement of behavior in any form was related to the group composition factor.

As illustrated in Figure 9, the effect of the group composition variable on constructiveness of play was reflected by the fact that, during the post condition only, severely and moderately handicapped children appeared to play more constructively during mixed play whereas mildly and nonhandicapped children engaged in more constructive play during unmixed play. However, the only difference to reach statistical significance was for the severely handicapped group and the magnitude of the effect was rather small. Inspection of the results for individual children further supported the proposition that these differences produced little developmental impact. Specifically, for the severely and moderately handicapped children, fully 50% of the children in post testing played at least as constructively during unmixed as mixed play. Similarly, for the mildly and nonhandicapped children, 43% played at least as constructively during post testing in mixed compared to unmixed free play.

The experimental design selected for this study compared the same children in both mixed and unmixed conditions, in accordance with procedures described earlier. This eliminated many of the problems commonly associated with efficacy studies, such as obtaining matched groups, equating teacher characteristics, assuring equivalent curricula, etc., but did admit the possibility of carry-over effects between mixed and unmixed conditions.[9] Examining this more closely, it could be argued that involvement in mixed play by the nonhandicapped and mildly handicapped children resulted in a reduction or suppression of social play and constructiveness of play skills that carried over to unmixed play. This would have the effect of minimizing differences between the two conditions.

A number of factors, however, suggest that this did not occur. Specifically, no differences were noted during pre testing where such potentially disruptive effects had only a limited opportunity to have their impact. Although this does not alter the possibility that suppression over time occurred, the fact that the level of social play of the NH and Mi children compares favorably with those found in nonintegrated settings (Barnes, 1971; Parten, 1932), and the finding that NH and Mi children progressed well throughout the entire program in cognitive and linguistic measures as well (feasibility) suggests that this is not a plausible explanation.

Similarly, it could be argued that involvement by moderately and severely handicapped children with their more advanced peers upgraded their developmental levels for play to such an extent that differences between mixed and unmixed play were minimized through transfer of these skills. This argument is somewhat more plausible in that Devoney et al. (1974) and Feitelson et al. (1972) have noted a delayed imitation effect in play for the less advanced children, although once again, no differences were observed even during pre testing.

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[9] Also note that unmixed groups were stable but that the identity of playmates differed on a variable schedule in the mixed condition. If stability of or familiarity with playmates is of value in terms of level of social play, it was not observed in this study.

Arguments regarding potential carry-over effects seem less persuasive when discussing the behavior of teachers and the municative behavior of the children. As noted in the Results, communicative behavior for both the giving and receiving dimensions and for all four communication categories did not vary as a function of the composition of the group. No attempt was made at this point to look at the quality of the communications and this finding will be discussed in more detail in a later section (see Section III). Similarly, on the dimensions recorded, the teachers behaved in highly similar ways in both group composition conditions, and any difference or lack of effect cannot be attributed to any differential behavior on their part.

Taken together, from the perspective of nonhandicapped and mildly handicapped children, the proposition that this research most clearly supports is that no detrimental effects result on the variables measured from their involvement with severely and moderately handicapped children. Correspondingly, from the perspective of the severely and moderately handicapped children, this statement applies to the impact of introducing advanced children to less advanced children. Children played similarly, communicated similarly, and the teachers interacted in a similar fashion irrespective of the composition of the group. Despite the fact that the heterogeneous grouping provided fewer advanced playmates for the advanced children and a larger number of advanced playmates for the less advanced children, no substantial effect was noted.[10] It can also be stated, although somewhat less strongly since the potential for carry-over is more plausible, that placement of less advanced children in a more heterogeneous grouping did not facilitate their social play, constructiveness of play, or communicative interactions.

With regard to these conclusions, it is important to note first, that all children advanced developmentally throughout the course of the year, suggesting the existence of a feasible program. Second, to reiterate, the comparison of nonhandicapped and mildly handicapped children as a group provided the basis for measuring the impact of introducing less advanced handicapped children. Whether these results would have occurred if only nonhandicapped children were utilized or if other combinations of heterogeneous groupings of children were employed is a question for further research (see Guralnick, 1978b for discussion of possible relevant factors). Third, the impact of the group composition variable was assessed in terms of its relatively immediate effects as revealed by repeatedly switching the composition of the child's playmates. Whether this procedure had any impact or whether delayed effects occurred are also questions to be addressed by additional studies. Finally, interactions between the more advanced and less advanced groups did not occur to any substantial degree (see below). More extensive interactions may yield different outcomes.

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[10] One can speculate that a threshold number of compatible playmates is needed, but beyond this level the quality of social play is controlled by other factors.

The analyses of the interactions based on derived scores among children at different developmental levels during mixed free play revealed three clear patterns: (1) nonhandicapped and mildly handicapped children interacted more frequently with each other than expected on the basis of availability and less frequently than expected with moderately and severely handicapped children; (2) moderately and severely handicapped children interacted with all four developmental groups as expected by the criterion of availability; and (3) whenever this pattern of interaction changed over time, it was typically in the direction of enhancing these differences.

For the most part, these results are compatible with the limited number of previous findings. They clearly reveal that communicative interactions between nonhandicapped and mildly handicapped children occur at a very high level and that, from this perspective, total integration can be considered to be achieved (see Ispa & Matz, 1978). In fact, the mildly handicapped children tended to show a preference for interacting with NH children. This was further supported by an analysis of interactions during unmixed periods in which the two groups were not distinguishable on the basis of their interaction patterns. It is important to note that, as in the Ispa and Matz (1978) investigation, the mildly handicapped children were older by about one year and had highly similar social play skills as measured by the Parten (1932) scale.

As indicated, the analysis of NH and Mi children's data revealed only limited social interaction between the advanced groups and the less advanced children, supporting Ray's (1974) results. For the mixed free play setting, this pattern tended to increase over time so any expectations regarding accommodating to less advanced children as a function of contact were not supported. There was, however, much less separation on the basis of derived scores for those interactions involving motor or gestural communications. Apparently, the more advanced children did make certain adjustments in the nature of their communications when communicating with the less advanced children.

The fact that moderately and severely handicapped children interacted about equally with all four developmental groups suggests more of a failure to differentiate among playmates than an indication of true social integration. The play encounters of these children were typically brief and poorly organized with all groups. Of course they did communicate with and received communications of a positive nature from more advanced children in the mixed conditions. What potential impact this had beyond play measures is not known nor was there an attempt to carry out such an analysis at this time. Detailed analyses of the reciprocal nature of these interactions in future studies (see Mueller & Lucas, 1975; Strain & Shores, 1977) should provide a better basis to determine the potential value of those interactions.

Parallel play interactions among the groups also followed this pattern, but much greater variability was observed. It appears that, in conjunction with the fact that there were only a limited number of negative comments addressed to Mo and S children or other evidence of active rejection, NH and Mi children potentially provide useful models during play. If a beneficial process did operate, however, it was not detected by our social interaction or constructiveness of play measures (with the exception of the severely handicapped group). As indicated earlier, some carry-over between these conditions could have occurred (see Devoney et al. 1974; Feitelson, et al. 1972), and further research is needed to clarify this issue.

The results and discussion regarding the interaction patterns just discussed apply equally to the patterns observed during gross-motor play. Some differences, however, were noted in that a lesser degree of separation by NH and Mi children when interacting with less advanced children as measured by motor or gestural communications was not noted, and there was no noticeable major change over time.

Moreover, when comparing the social play of children in gross and mixed free play, considerable differences were obtained. Of most significance, for all groups, associative play was much more prevalent during gross than mixed free play. Similarly, a much greater frequency of communications occurred during the gross-motor period. Whether these findings can be traced to differences inherent in the two play situations or to other factors, such as the larger number of children involved in gross-motor play, the time of day, or differential teacher behavior, needs further study. It is quite possible that since these differences were so marked and the fact that constructiveness of play also differed, this result may have a number of significant implications for the design of early intervention programs.

Conclusions

This first study attempted to assess the nature of the social interactions that exist among children at different developmental levels and to determine the impact, both actual and potential, of the integration process. The broad question of whether social integration has been achieved requires clarification. Certainly, by any standard, nonhandicapped and mildly handicapped children are effectively socially integrated. Whether this statement can apply to the less advanced children depends on the criteria that are employed. Unquestionably, social interaction between the less advanced and more advanced children occurred. In fact, from the perspective of severely and moderately handicapped children, their interactions were distributed about equally to all groups. For nonhandicapped and mildly handicapped children, interactions were not equally distributed by any means, yet approximately 14% of their communicative interactions were directed to their less advanced peers. This percentage was substantially higher, approximately 30%, when looking at parallel play. It seems that the determination as to whether these outcomes constitute social integration, or some element of it, must await a conceptual scheme and associated criteria with respect to the goals of mainstreaming or integration. Perhaps some threshold level of interactions for the various groups can be utilized in combination with criteria evaluating the quality and nature of these interactions as a measure of the degree of social integration. Should such a scheme be forthcoming, these criteria can be applied to these data and to those of the studies to follow.

However this is resolved, from a public policy perspective, it can be strongly argued on the basis of these and related data that placement of preschool children of different developmental levels in the same setting is indeed the least restrictive environment on the basis of feasibility. These data clearly indicate that no detrimental effect on the social play, constructiveness of play, or frequency of communications for any group of children occurred as a result of including children of different developmental levels in free play activities. In addition, this study did not indicate that moderately and severely handicapped children received any beneficial effect that can be traced to their involvement with more advanced peers, although it must be pointed out that the generality of these findings cannot be assessed at this time and must await additional systematic efforts.

Although play is a critical element in a child's preschool years, feasibility and efficacy as measured here were limited to assessments in that domain only. With this in mind, it is suggested that an optimistic outlook with regard to uncovering those conditions under which more effective development by less advanced children in integrated settings occurs should still be maintained. This posture is taken here since there appears to be sufficient evidence for the potential positive impact of an integrated environment on the less advanced children. As noted elsewhere (Guralnick, 1978b), the availability of advanced models during play, experiencing more realistic social consequences, and observing more appropriate speech, are all conditions that can potentially foster the development of young handicapped children. The systematic arrangement of appropriate experiences and the design of environments towards this end appears to be an area in need of study.

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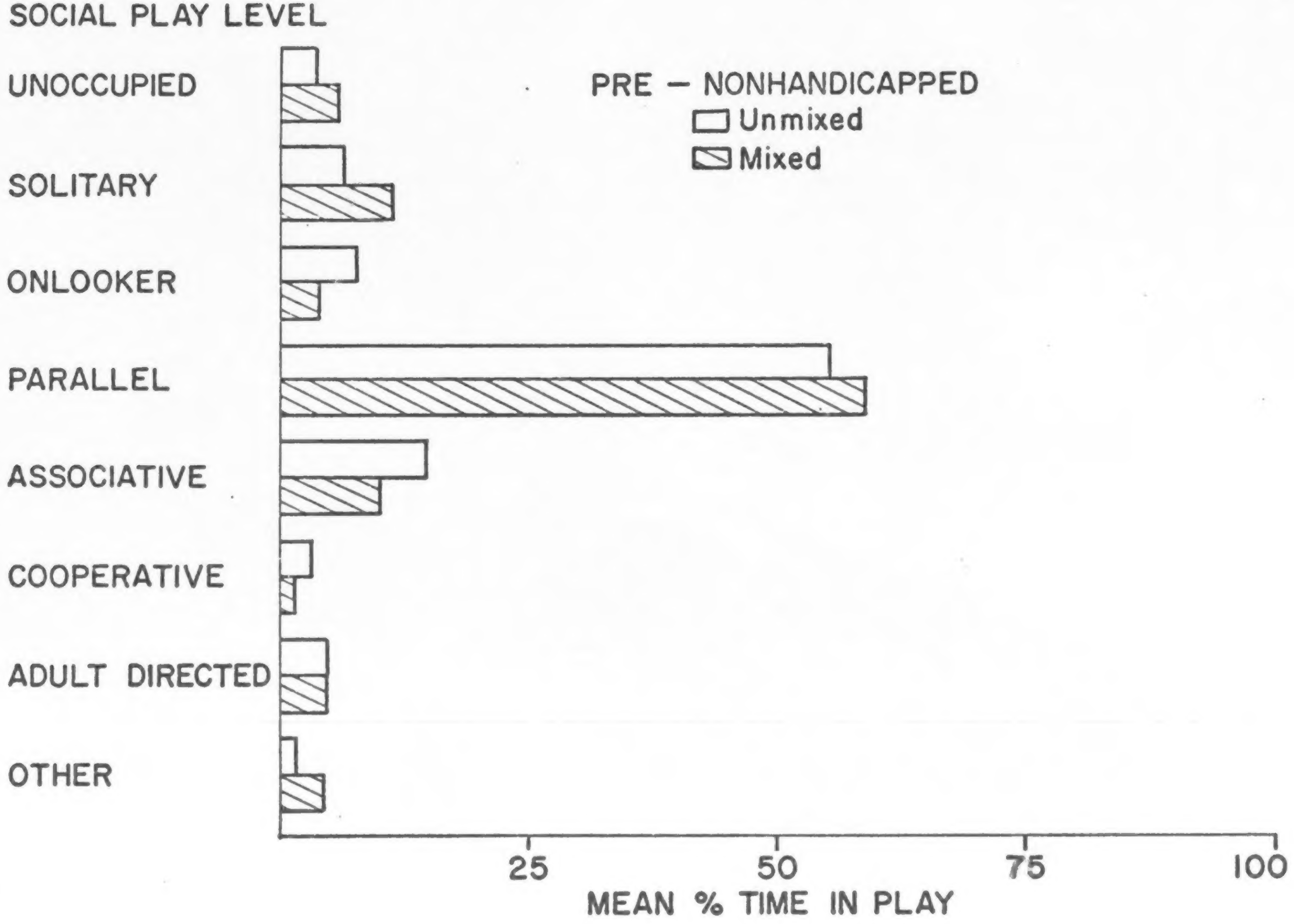
Fig. 1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MEAN % TIME IN PLAY

Fig. 2

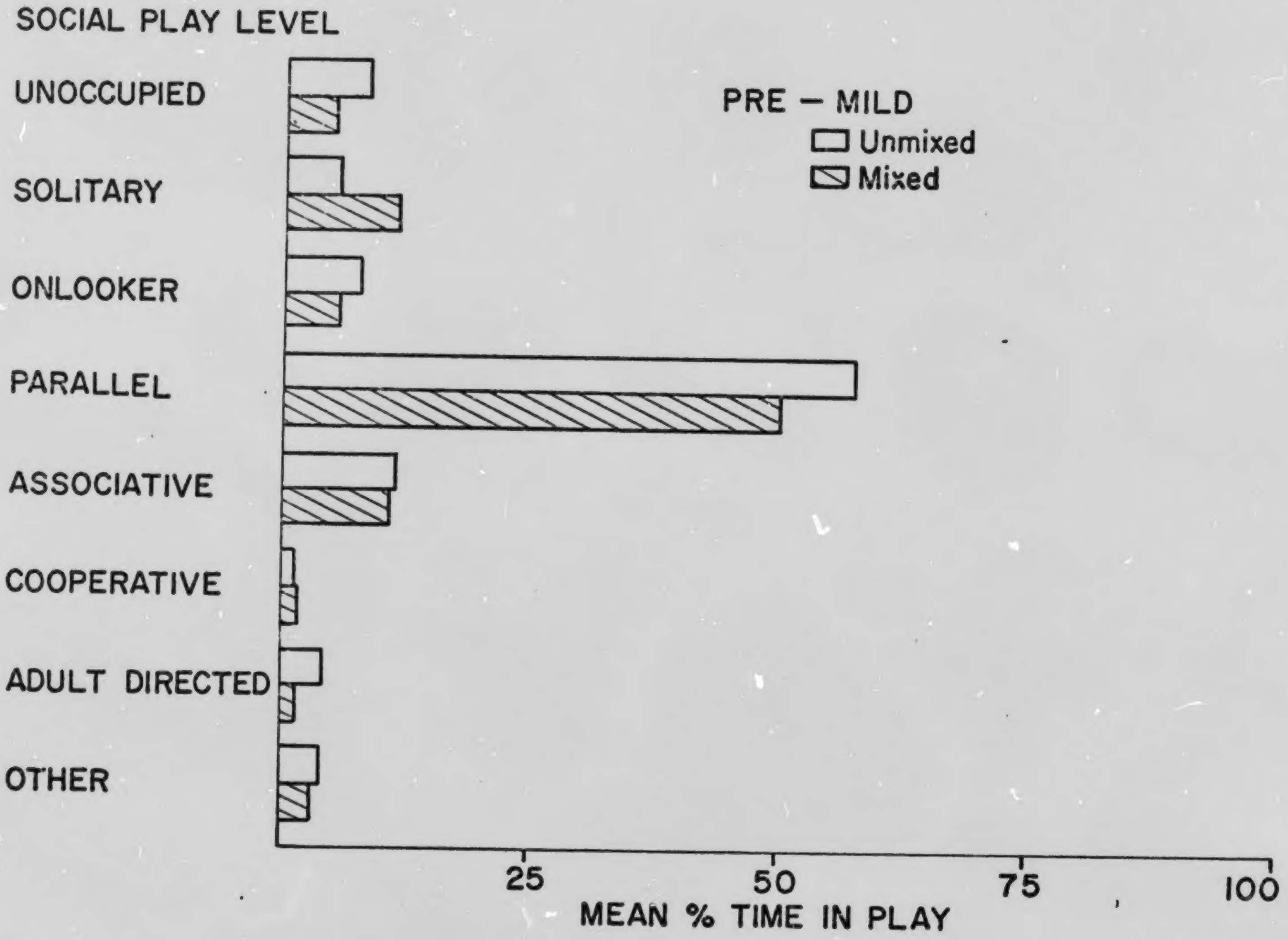
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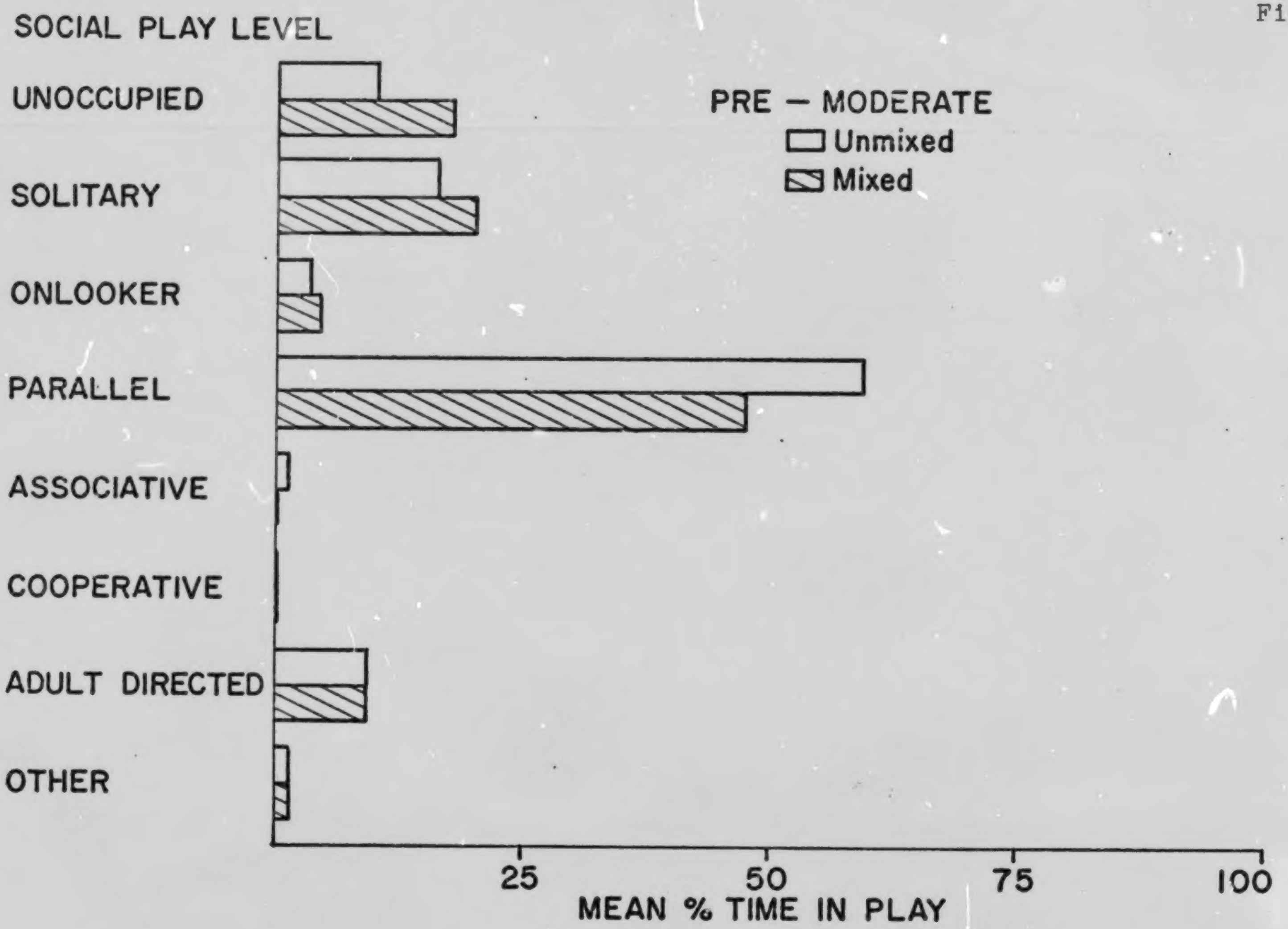
Fig. 3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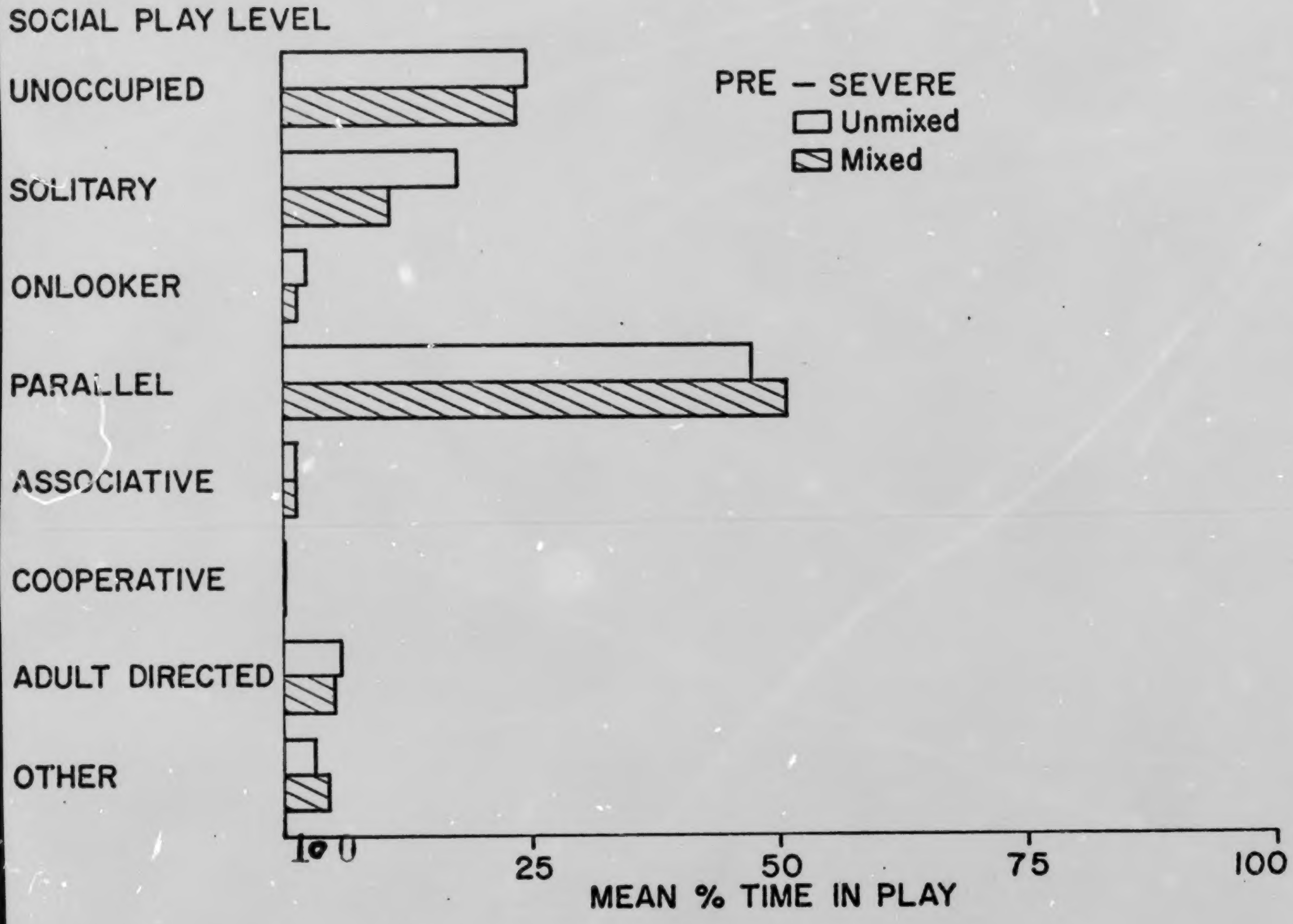
MEAN % TIME IN PLAY

Fig. 4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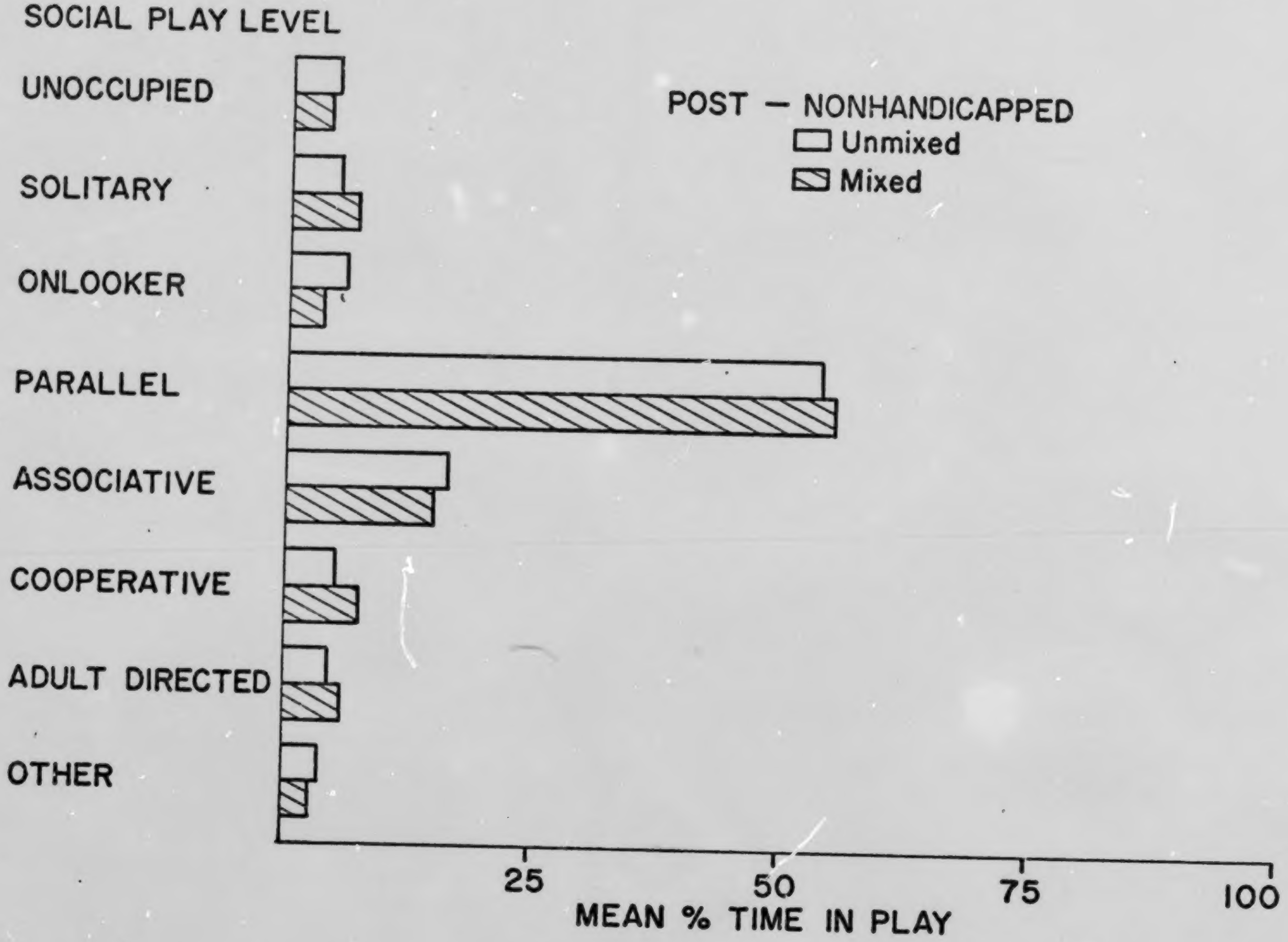
MEAN % TIME IN PLAY

Fig. 5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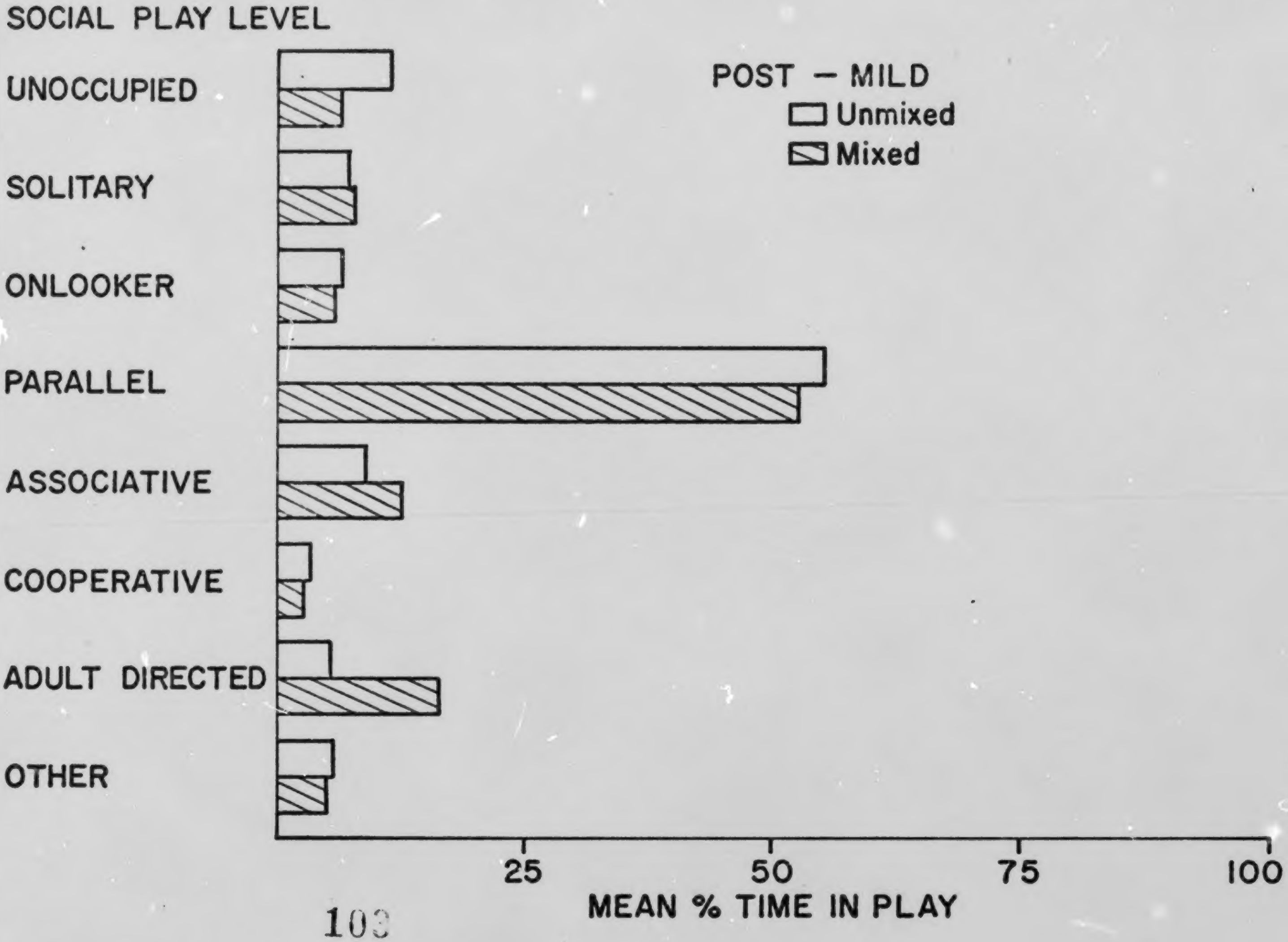
MEAN % TIME IN PLAY

Fig. 6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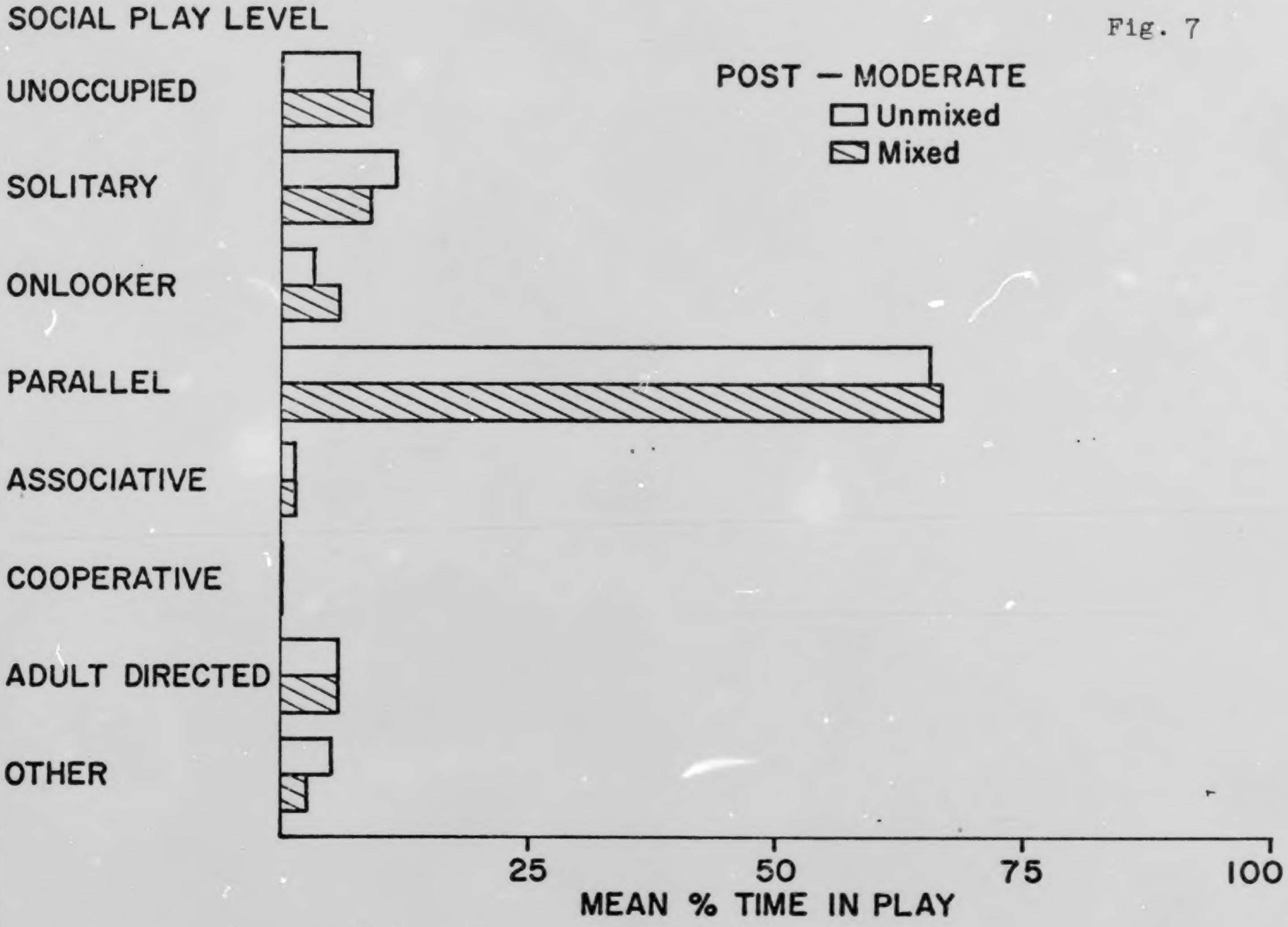
MEAN % TIME IN PLAY

Fig. 7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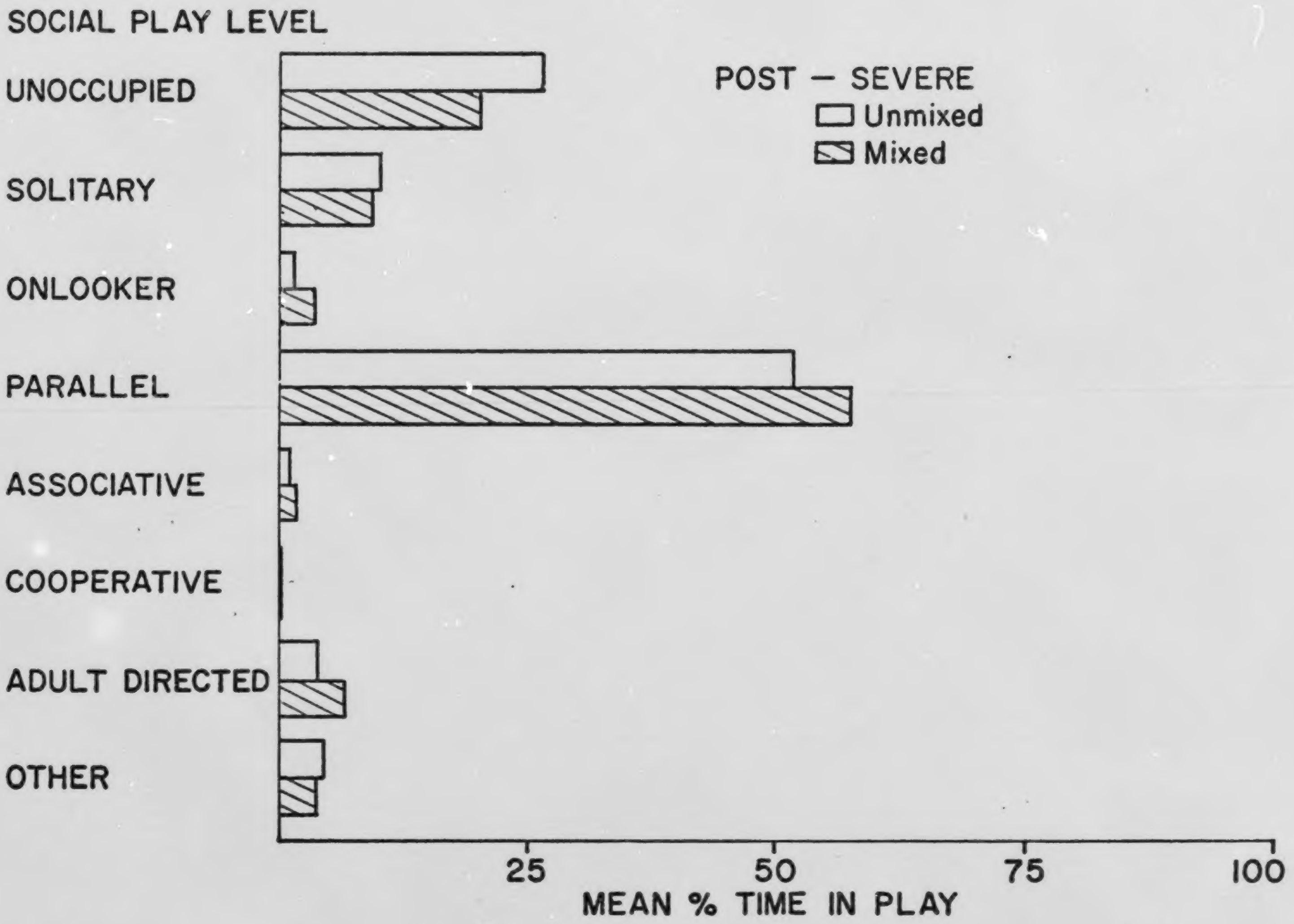
MEAN % TIME IN PLAY

Fig. 8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MEAN % TIME IN PLAY

Fig. 9

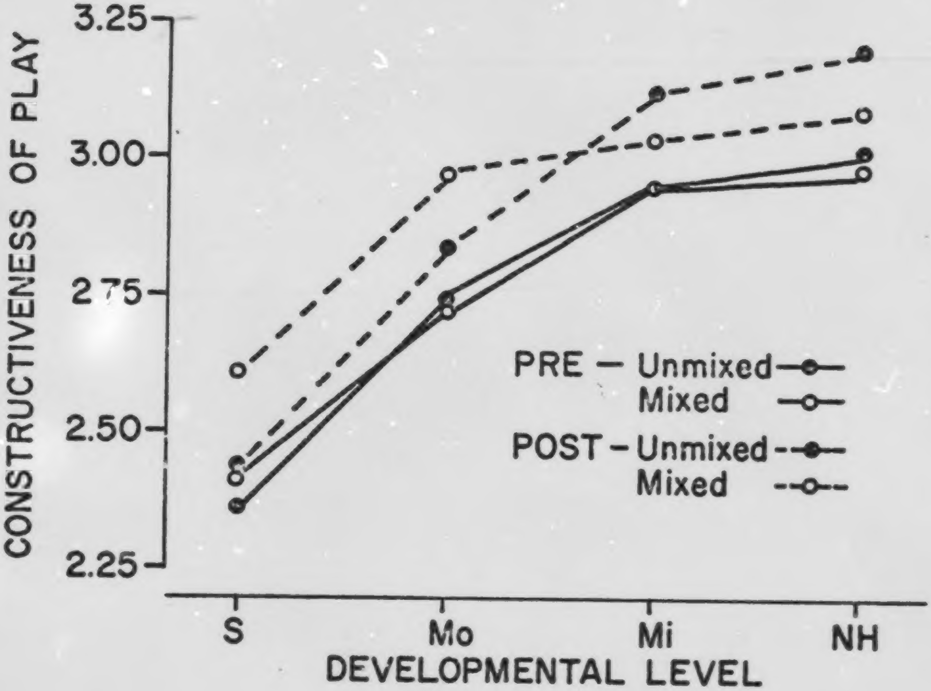

CONSTRUCTIVENESS OF PLAY
3.25
3.00
2.75
2.50
2.25
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL
PRE – Unmixed
Mixed
POST – Unmixed
Mixed

Fig. 11

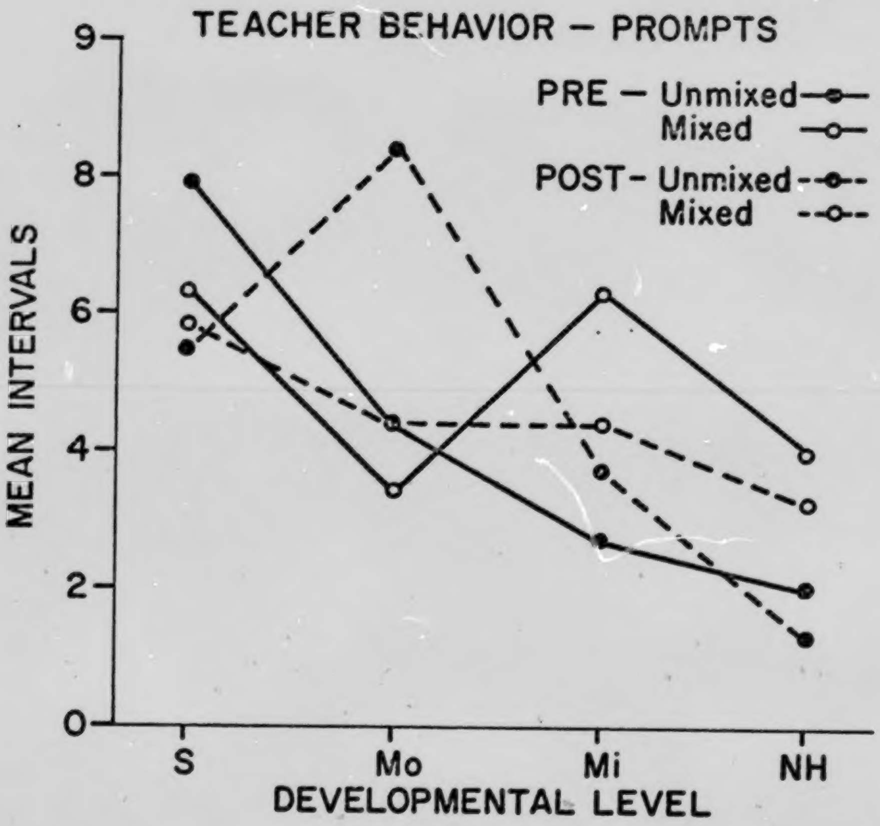

TEACHER BEHAVIOR – PROMPTS
PRE – Unmixed
Mixed
POST – Unmixed
Mixed
MEAN INTERVALS
0
2
4
6
8
9
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 12

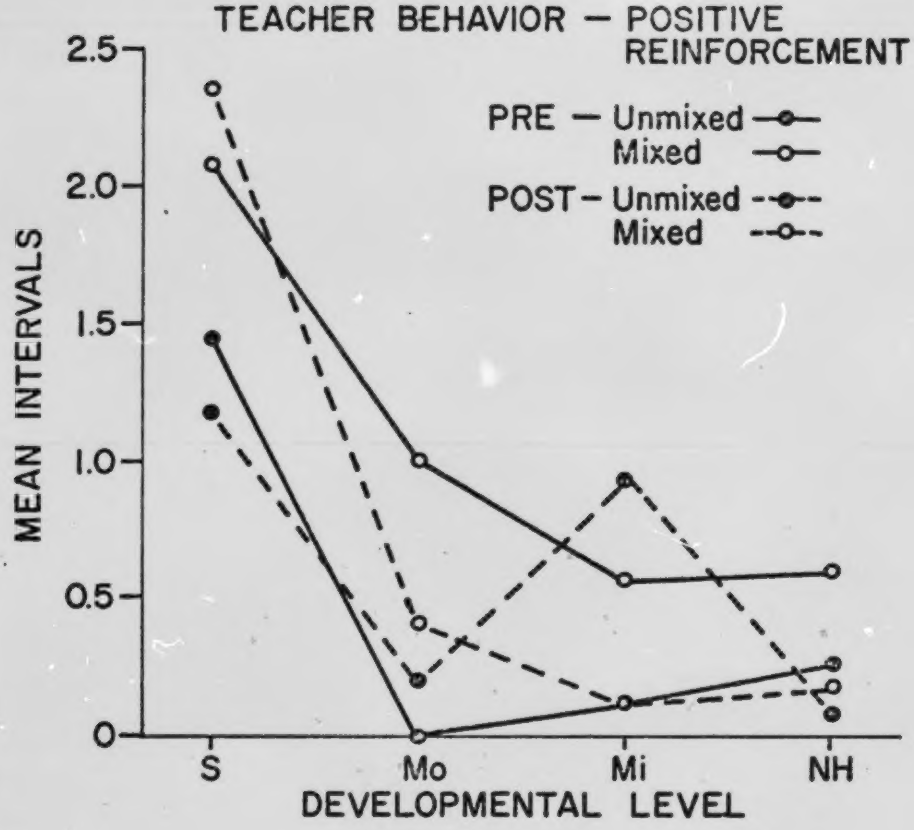

TEACHER BEHAVIOR — POSITIVE REINFORCEMENT
PRE — Unmixed
Mixed
POST — Unmixed
Mixed
MEAN INTERVALS
2.5
2.0
1.5
1.0
0.5
0
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 13

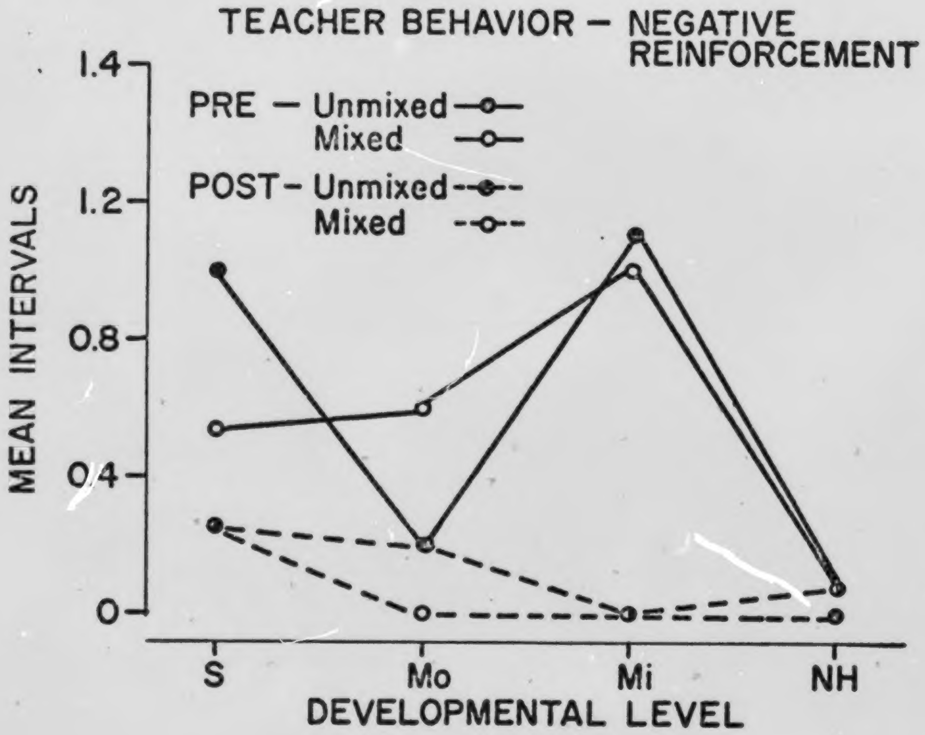

TEACHER BEHAVIOR – NEGATIVE REINFORCEMENT
PRE – Unmixed
Mixed
POST – Unmixed
Mixed
MEAN INTERVALS
1.4
1.2
0.8
0.4
0
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 14

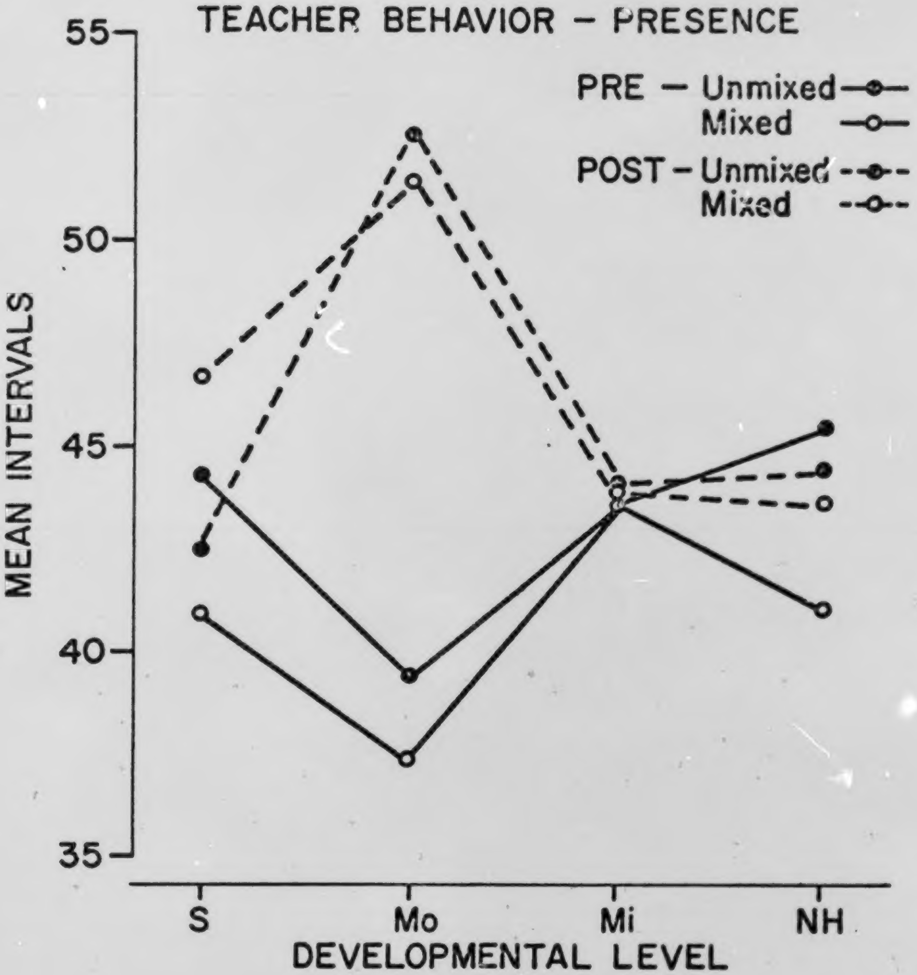

TEACHER BEHAVIOR - PRESENCE
PRE - Unmixed
Mixed
POST - Unmixed
Mixed
MEAN INTERVALS
55
50
45
40
35
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 15

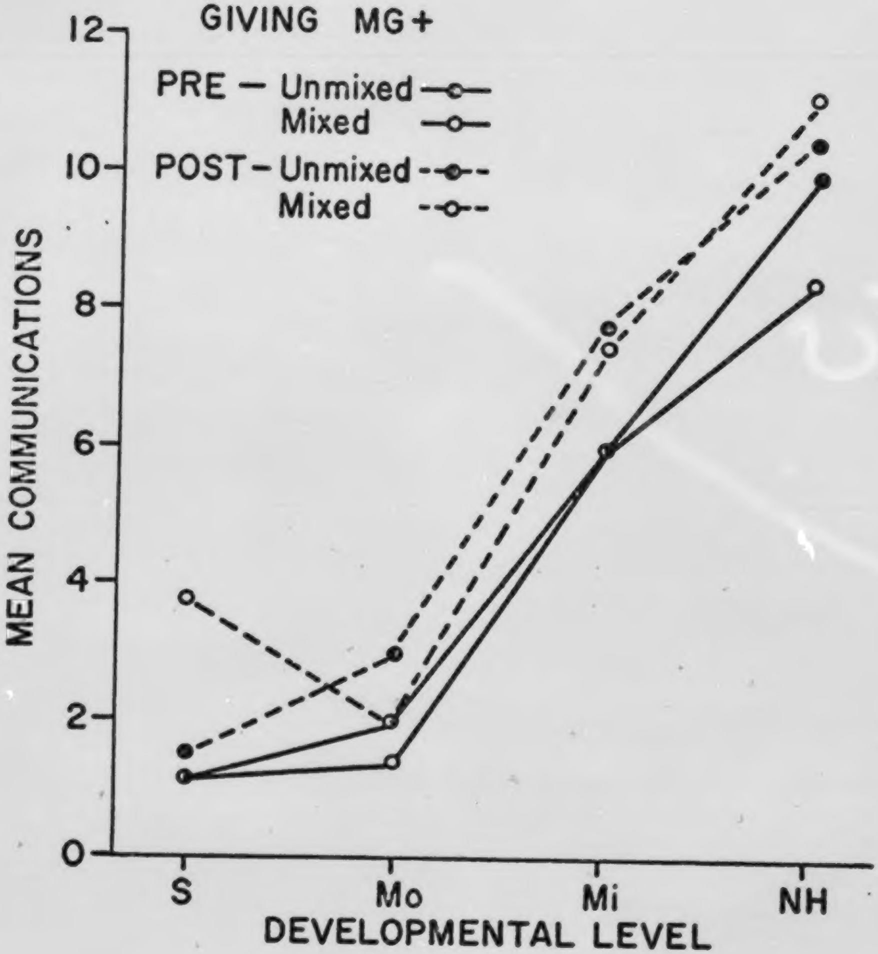

GIVING MG+
PRE – Unmixed
Mixed
POST – Unmixed
Mixed
MEAN COMMUNICATIONS
0
2
4
6
8
10
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 16

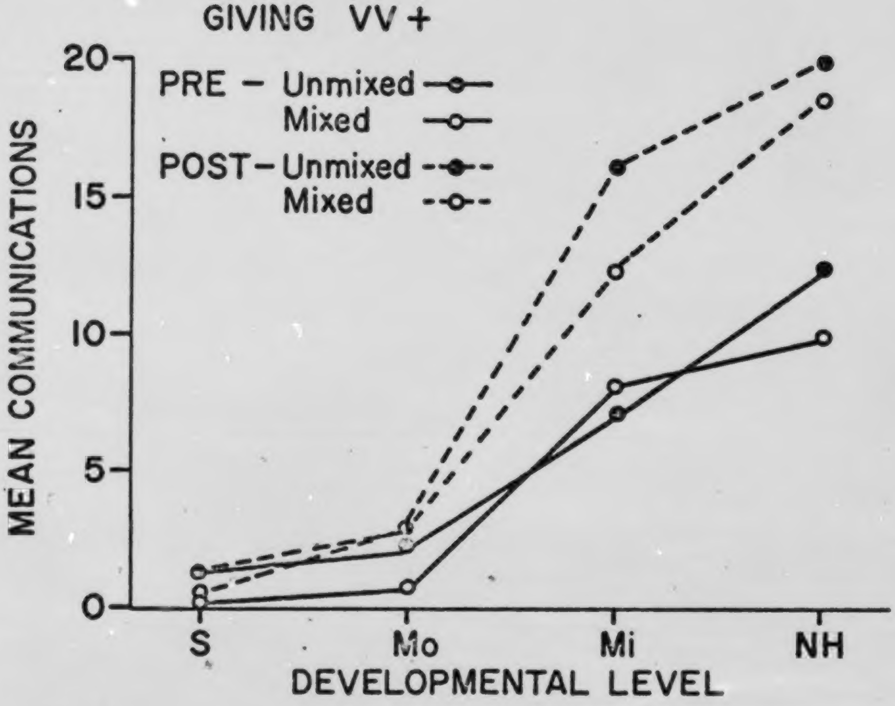

GIVING VV +
PRE - Unmixed —o—
Mixed —o—
POST - Unmixed --●--
Mixed --o--
MEAN COMMUNICATIONS
20
15
10
5
0
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 17

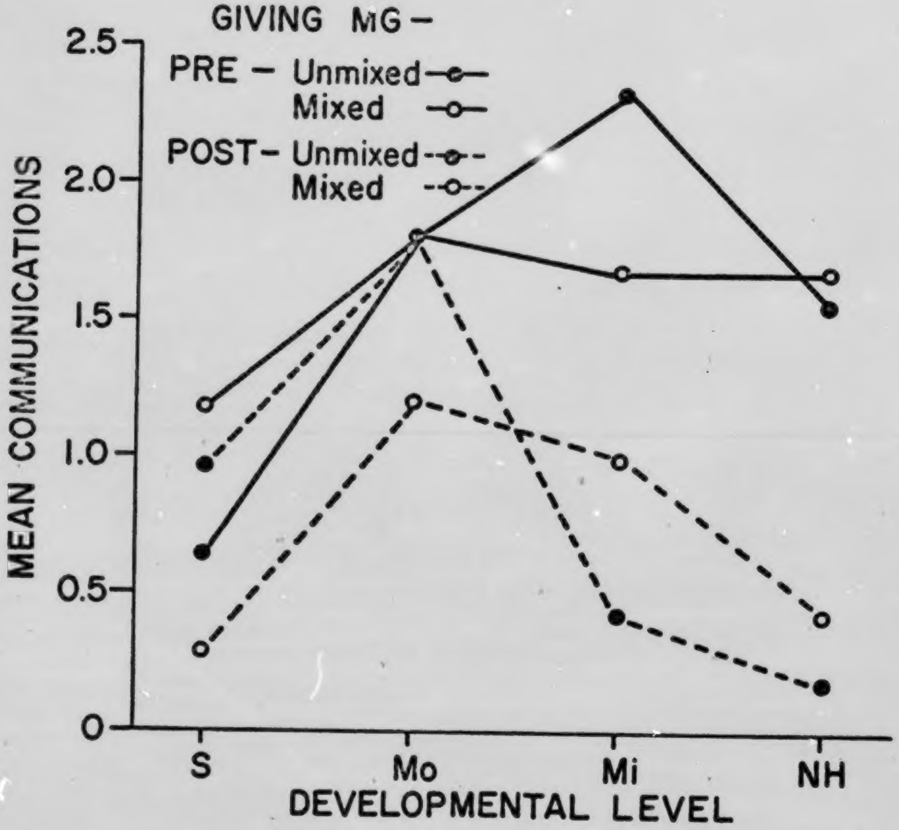

GIVING MG -
PRE - Unmixed
Mixed
POST - Unmixed
Mixed
MEAN COMMUNICATIONS
2.5
2.0
1.5
1.0
0.5
0
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 18

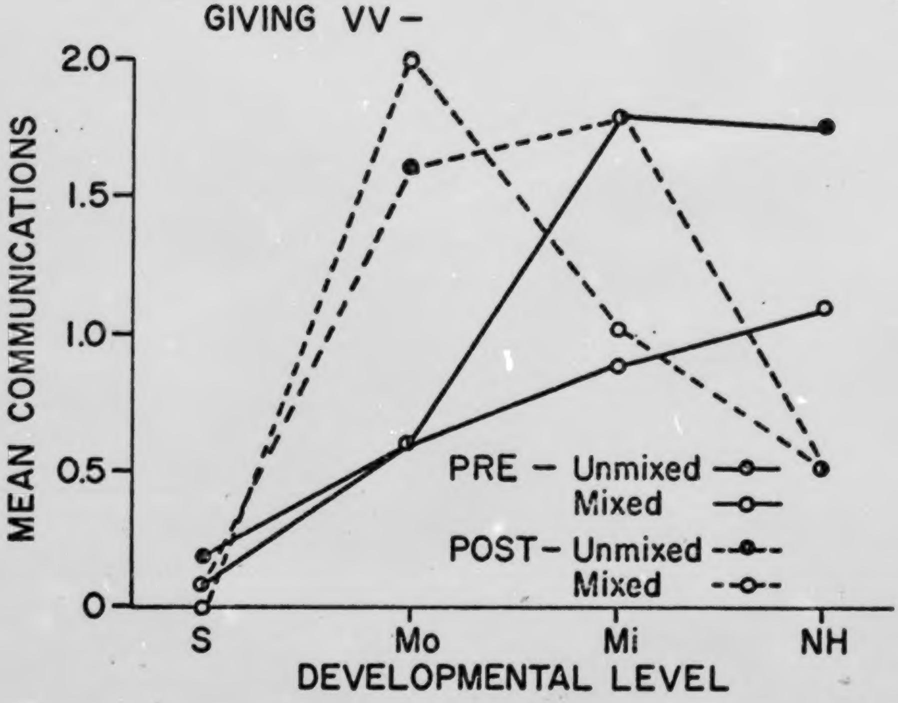

GIVING VV -
MEAN COMMUNICATIONS
2.0
1.5
1.0
0.5
0
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL
PRE - Unmixed
Mixed
POST - Unmixed
Mixed

Fig. 19

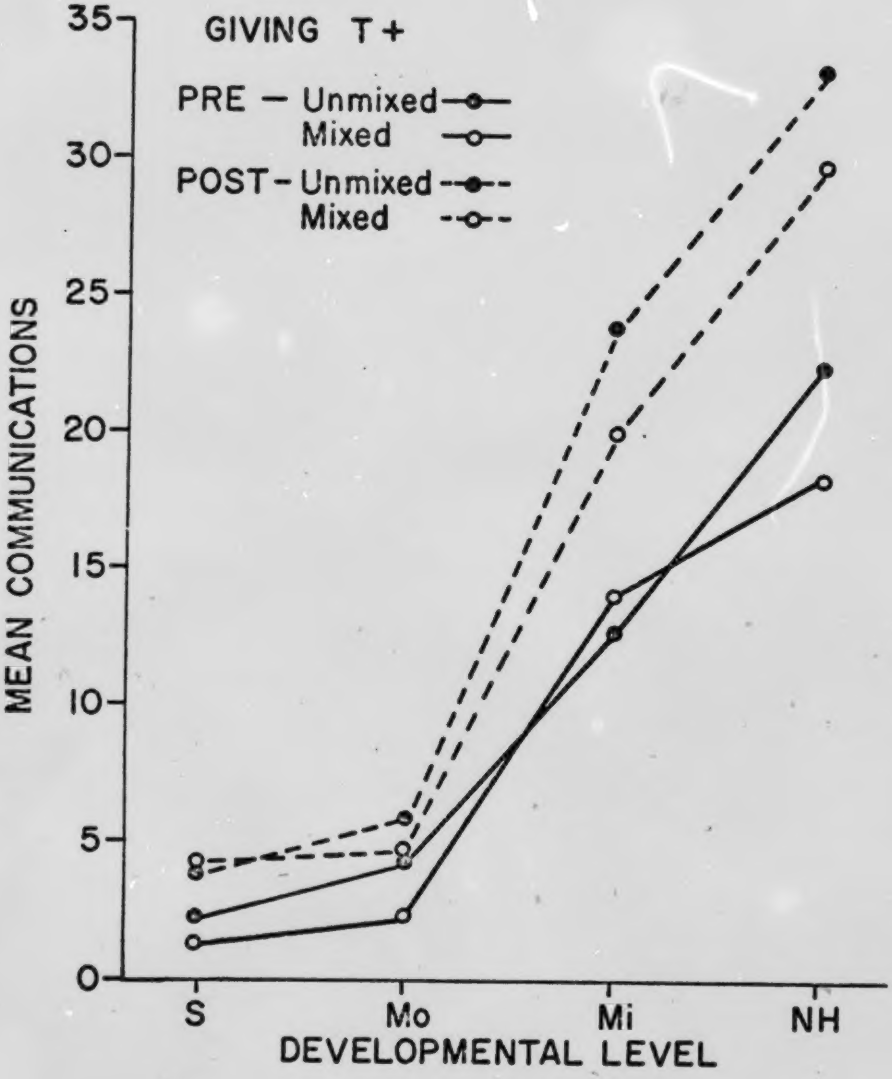
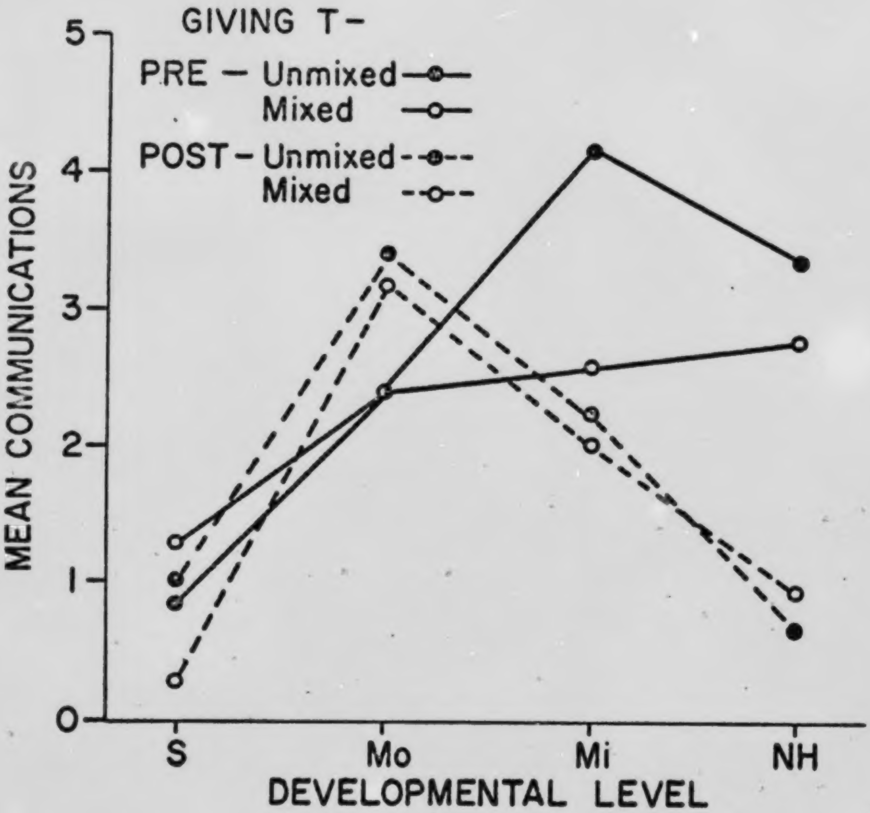

GIVING T+
PRE – Unmixed —●—
Mixed —○—
POST – Unmixed --●--
Mixed --○--
MEAN COMMUNICATIONS
0
5
10
15
20
25
30
35
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 20


GIVING T-
PRE – Unmixed —●—
Mixed —○—
POST – Unmixed --●--
Mixed --○--
MEAN COMMUNICATIONS
0
1
2
3
4
5
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

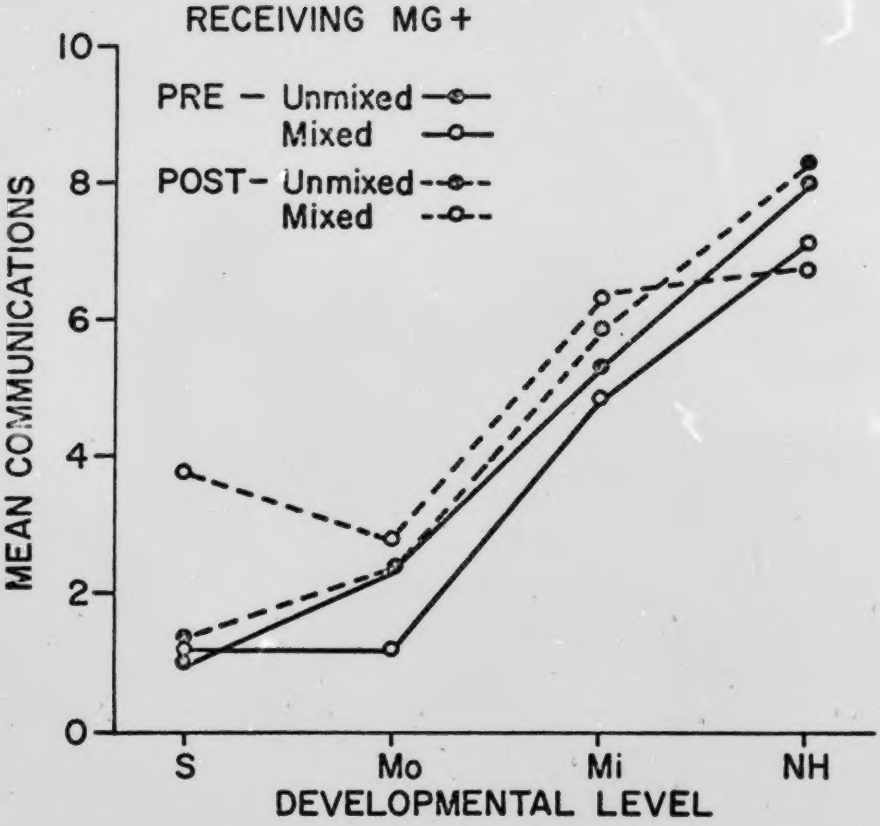

RECEIVING MG+
PRE – Unmixed
Mixed
POST – Unmixed
Mixed
MEAN COMMUNICATIONS
0
2
4
6
8
10
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 22

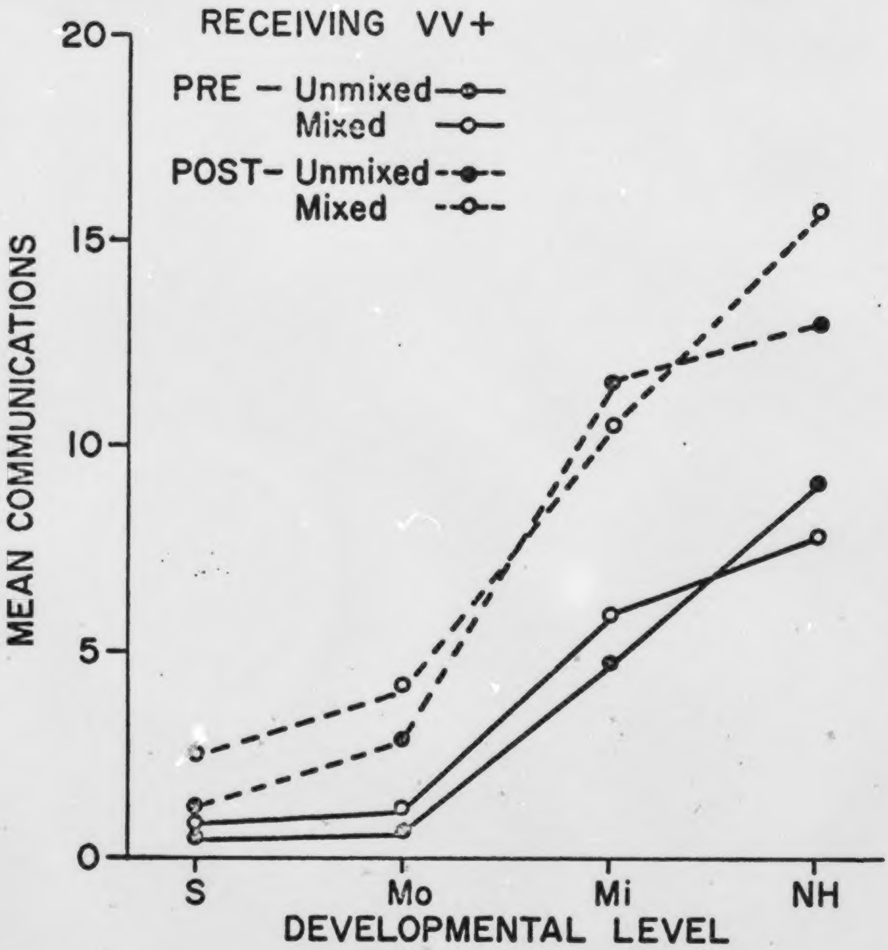
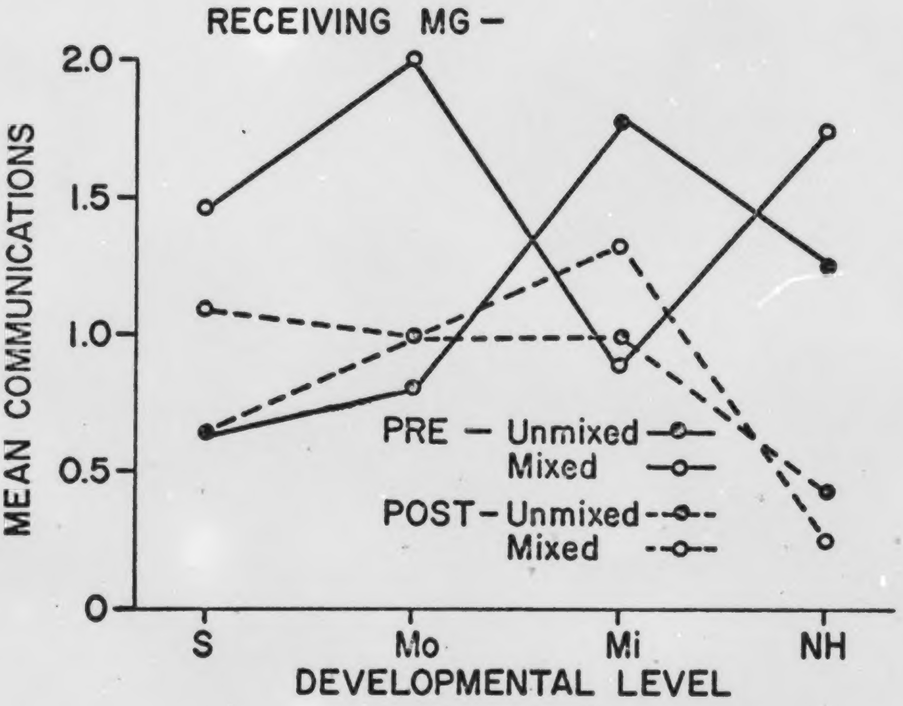

RECEIVING VV+
PRE – Unmixed –○–
Mixed –○–
POST – Unmixed --●--
Mixed --○--
20
15
10
5
0
MEAN COMMUNICATIONS
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 23


RECEIVING MG-
MEAN COMMUNICATIONS
2.0
1.5
1.0
0.5
0
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL
PRE — Unmixed —●—
Mixed —○—
POST - Unmixed --●--
Mixed --○--

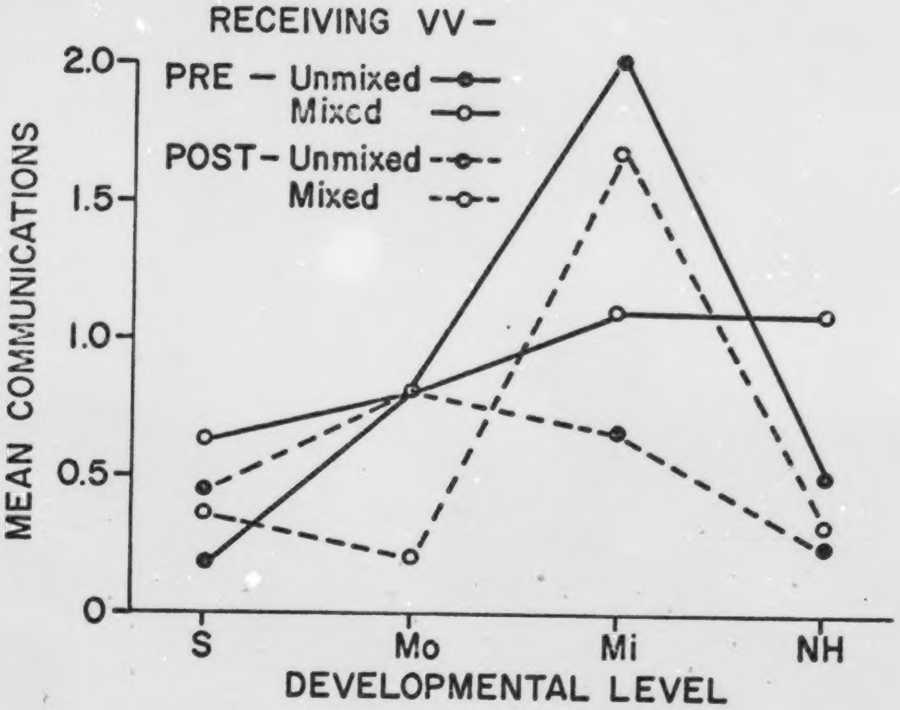

RECEIVING VV-
PRE - Unmixed
Mixcd
POST- Unmixed
Mixed
MEAN COMMUNICATIONS
2.0
1.5
1.0
0.5
0
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 25

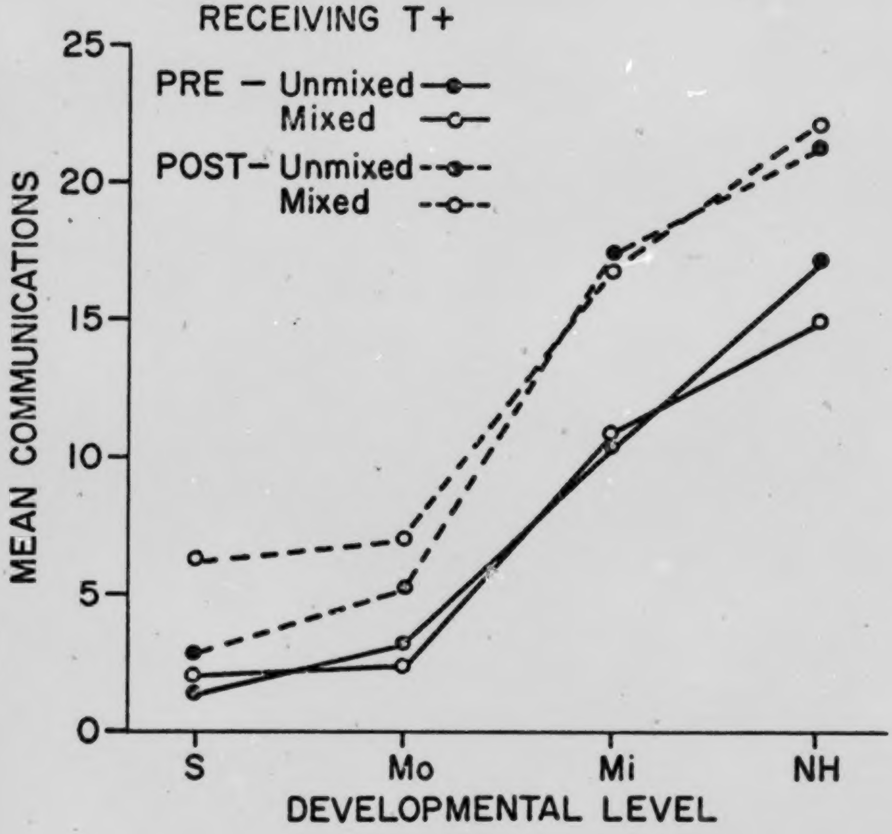

RECEIVING T+
PRE – Unmixed —●—
Mixed —○—
POST– Unmixed --●--
Mixed --○--
MEAN COMMUNICATIONS
0
5
10
15
20
25
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 26

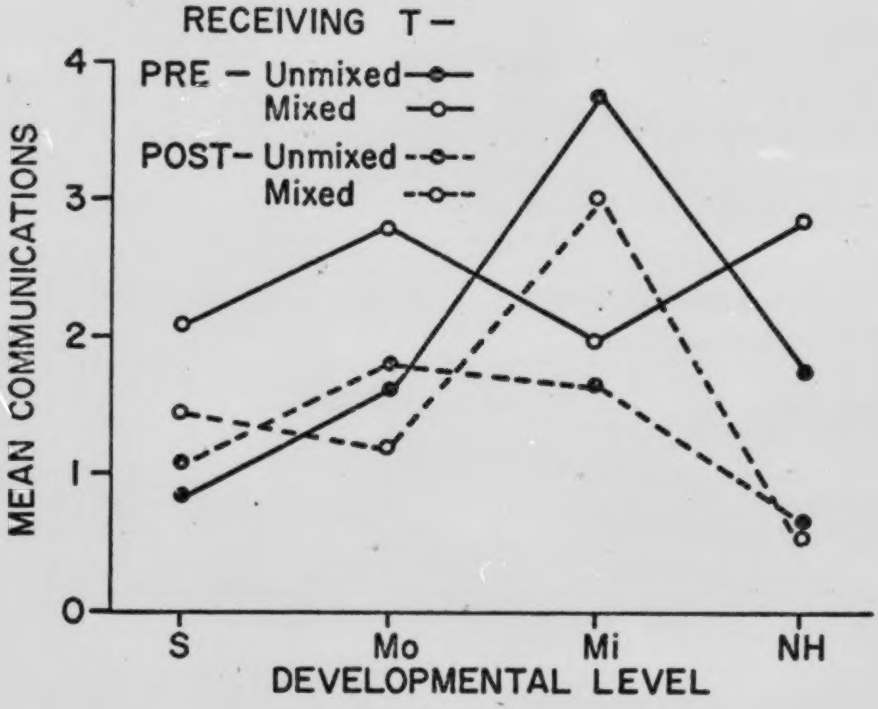

RECEIVING T-
PRE - Unmixed
Mixed
POST- Unmixed
Mixed
MEAN COMMUNICATIONS
0
1
2
3
4
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 27

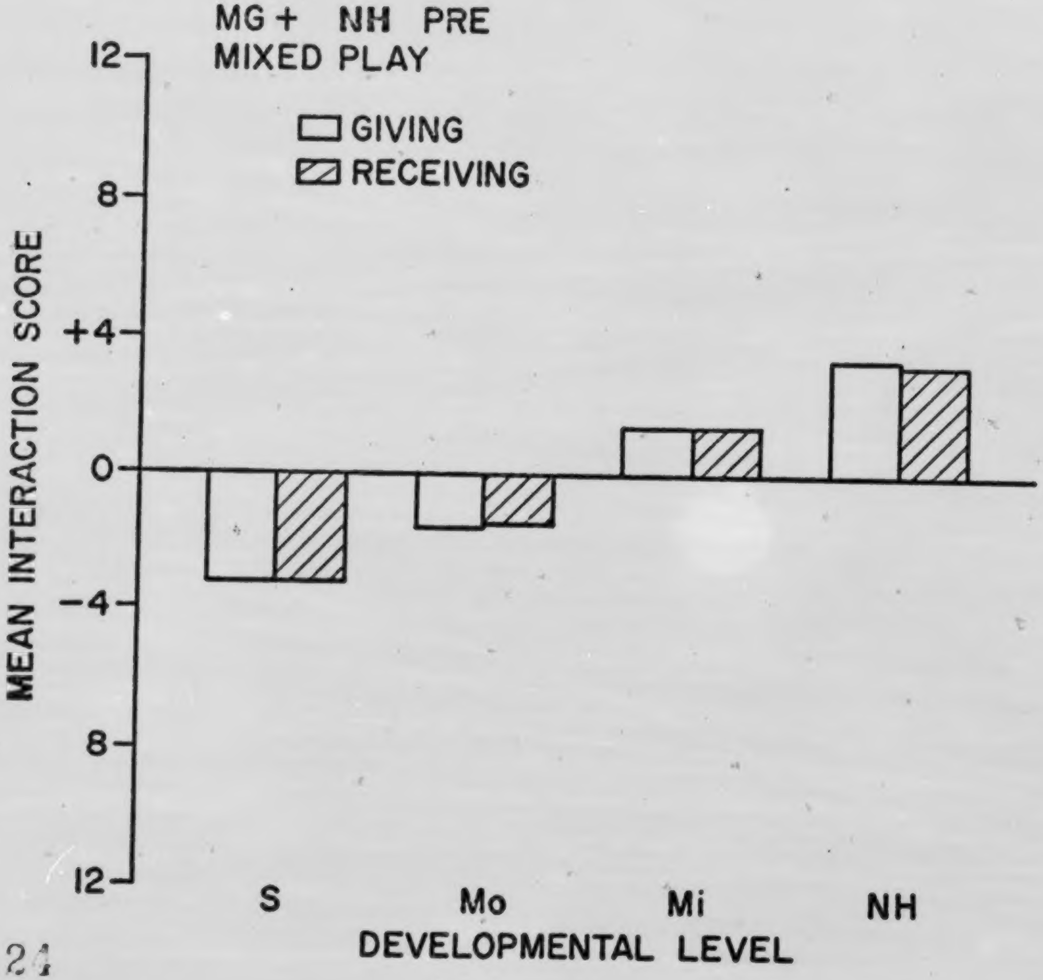

MG + NH PRE
MIXED PLAY
☐ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 28

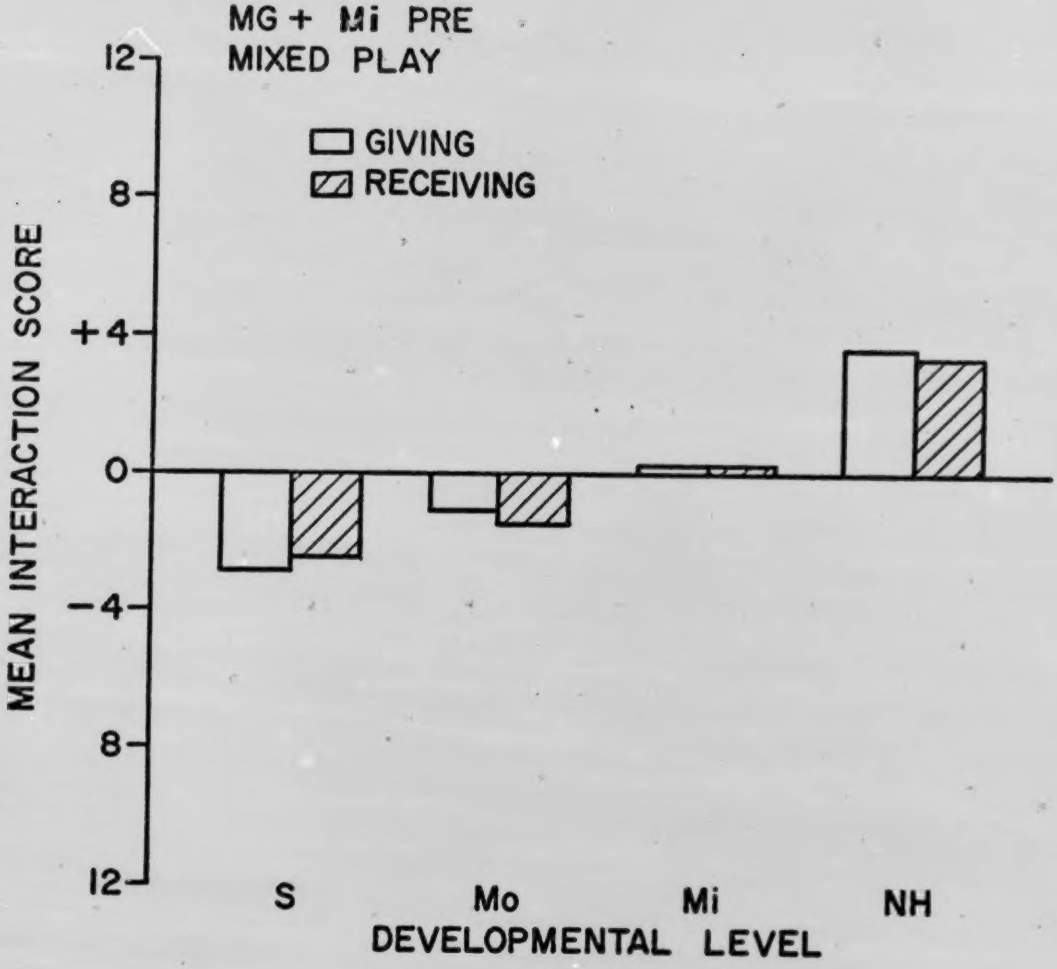

MG + Mi PRE
MIXED PLAY
☐ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 29

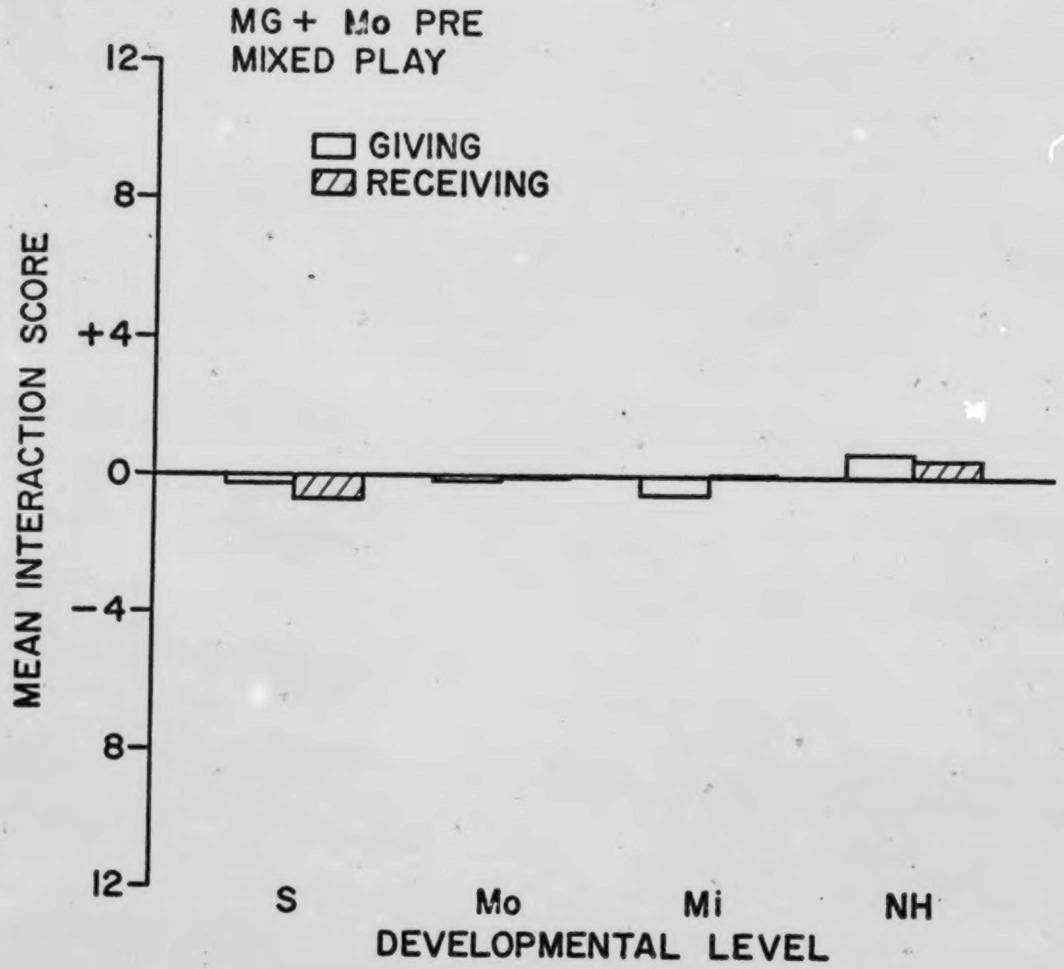

MG + Mo PRE
MIXED PLAY
GIVING
RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 30

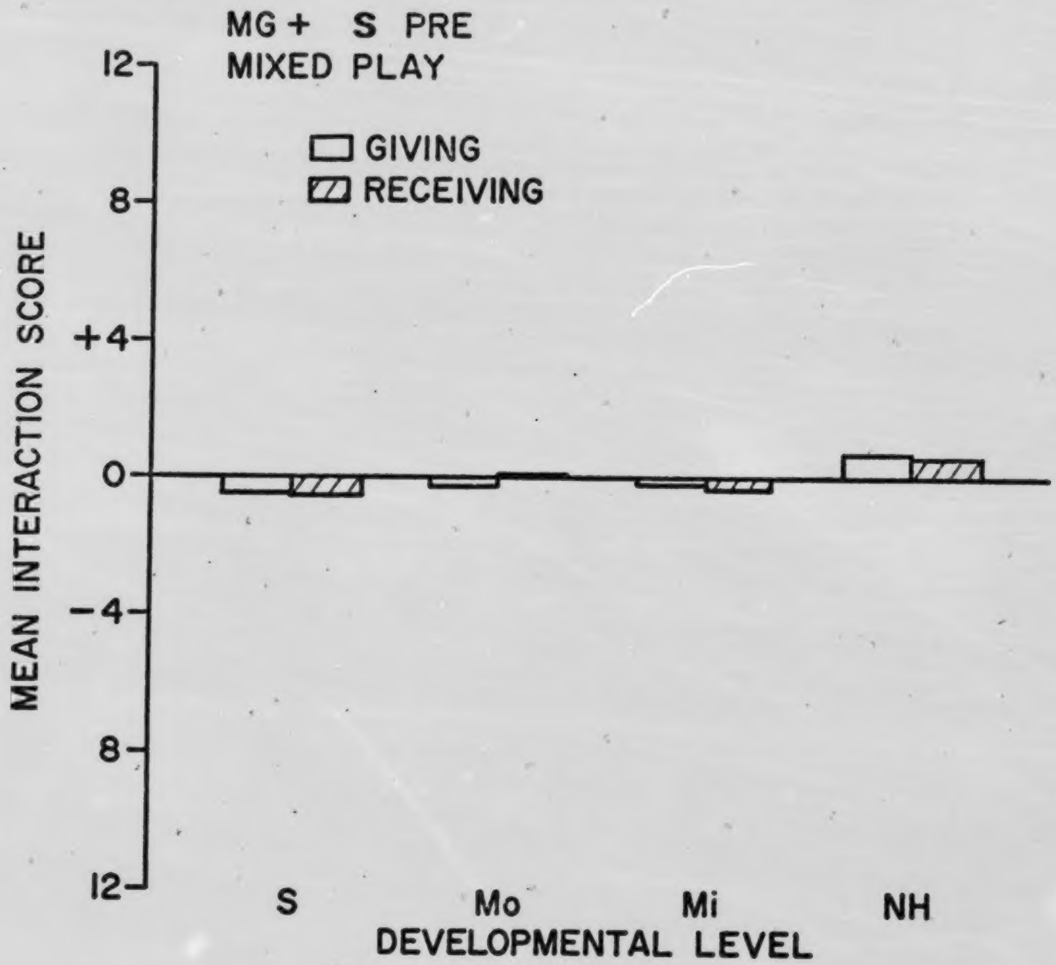

MG + S PRE
MIXED PLAY
☐ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 31

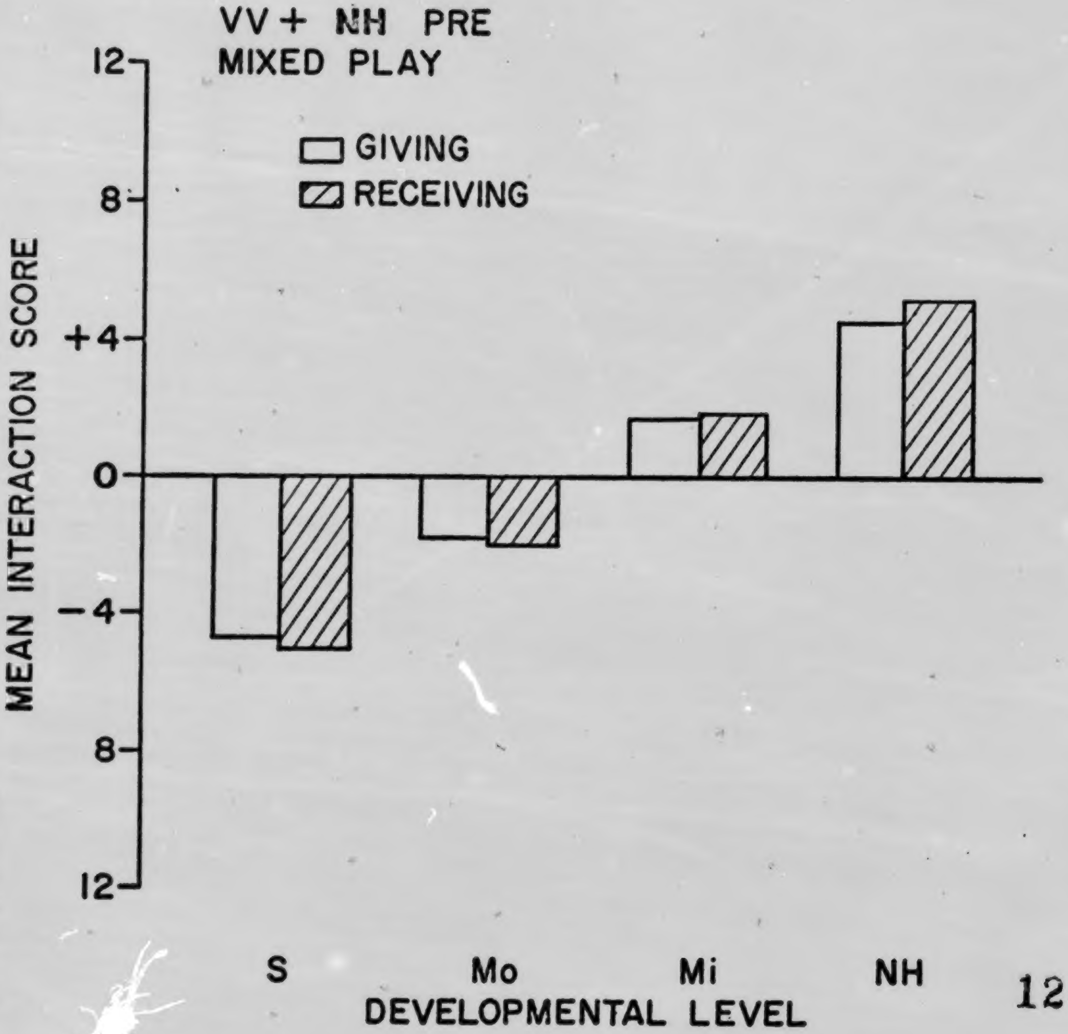

VV + NH PRE
MIXED PLAY
GIVING
RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 32

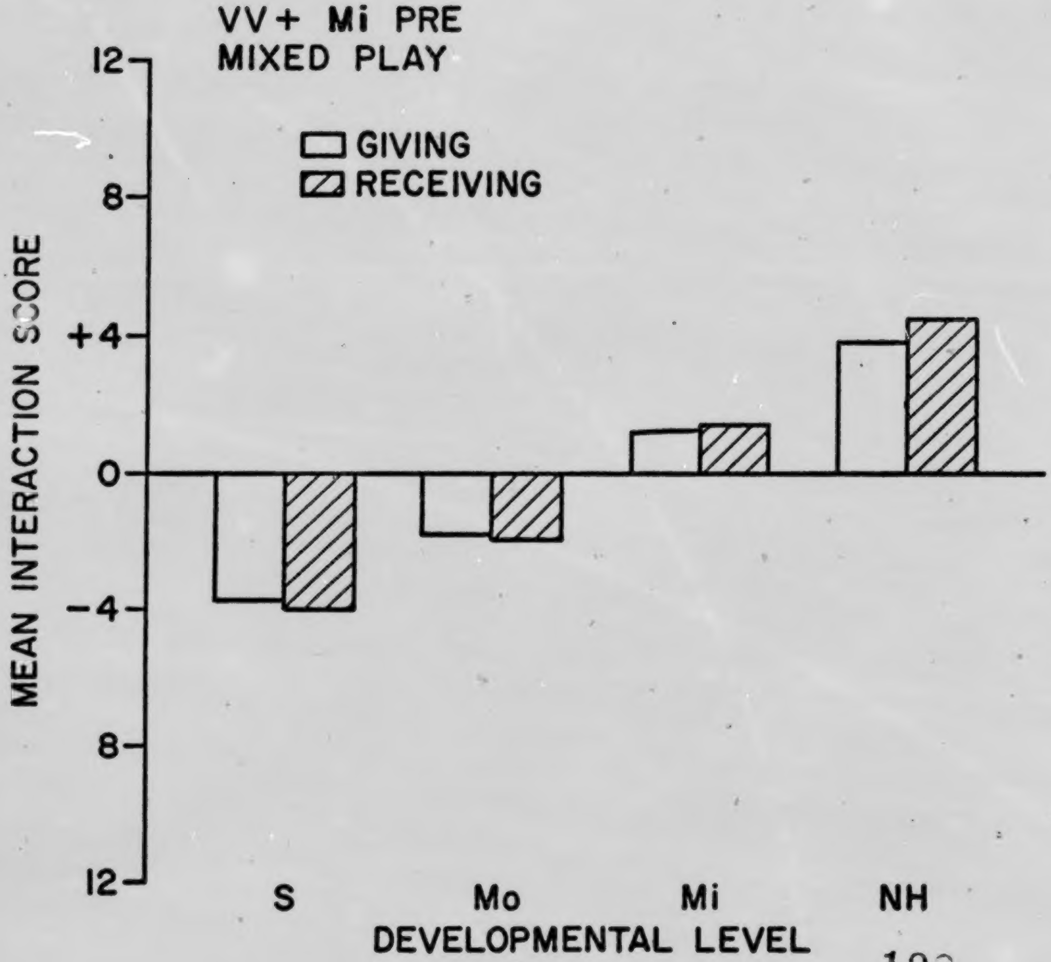
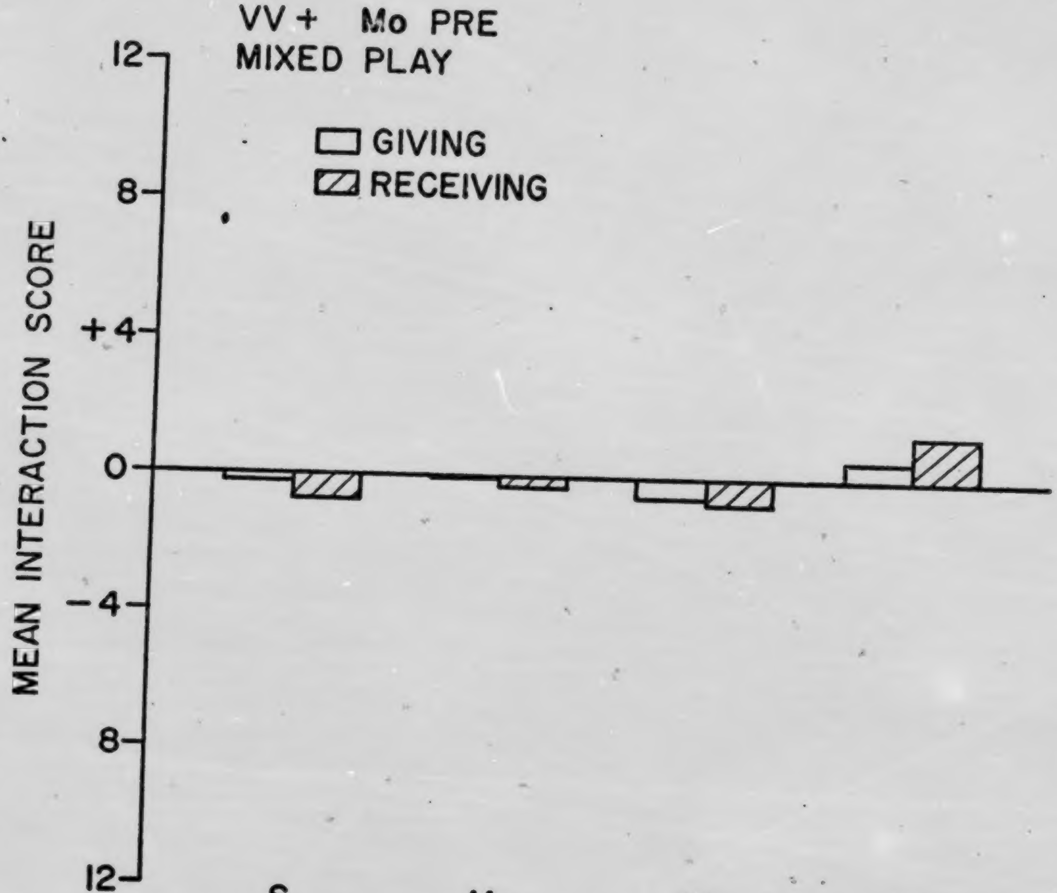

VV+ Mi PRE
MIXED PLAY
☐ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 33


VV + Mo PRE
MIXED PLAY
☐ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

130

Fig. 34

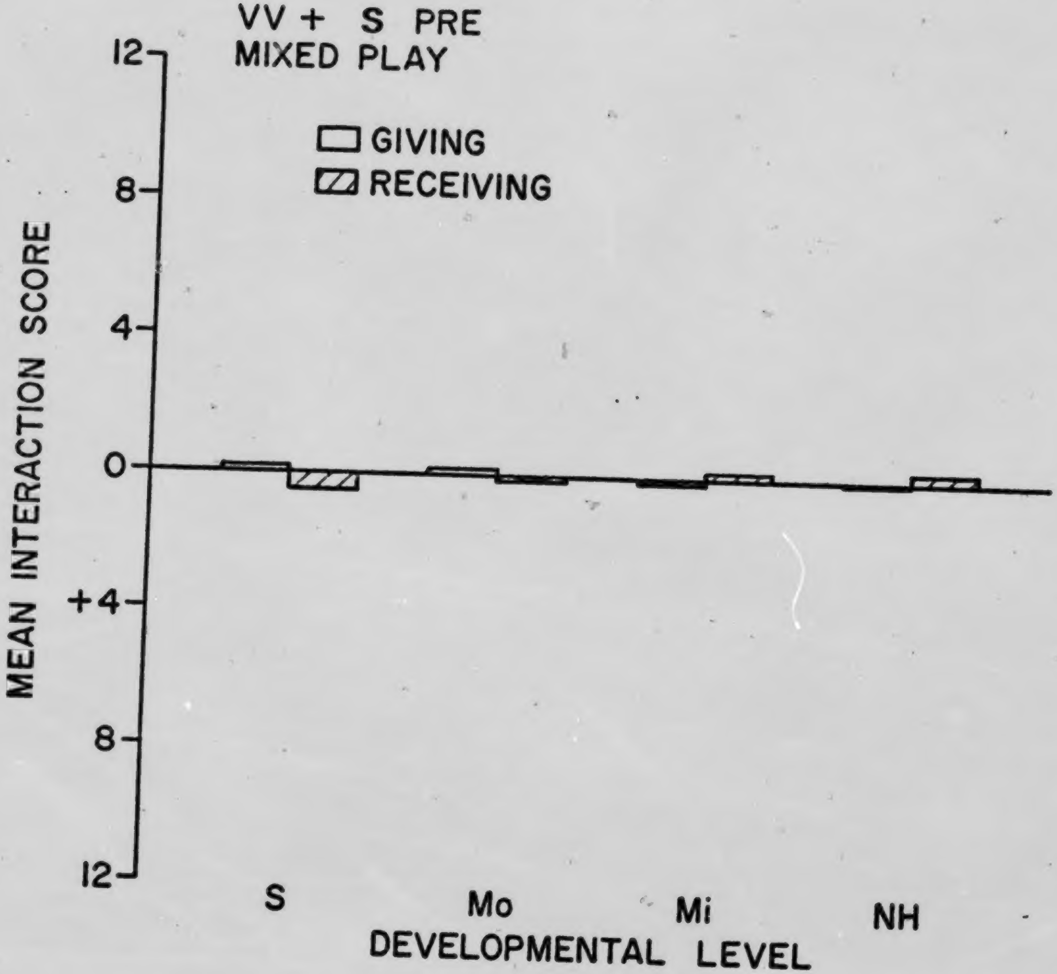

VV + S PRE
MIXED PLAY
☐ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
12
8
4
0
+4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 35

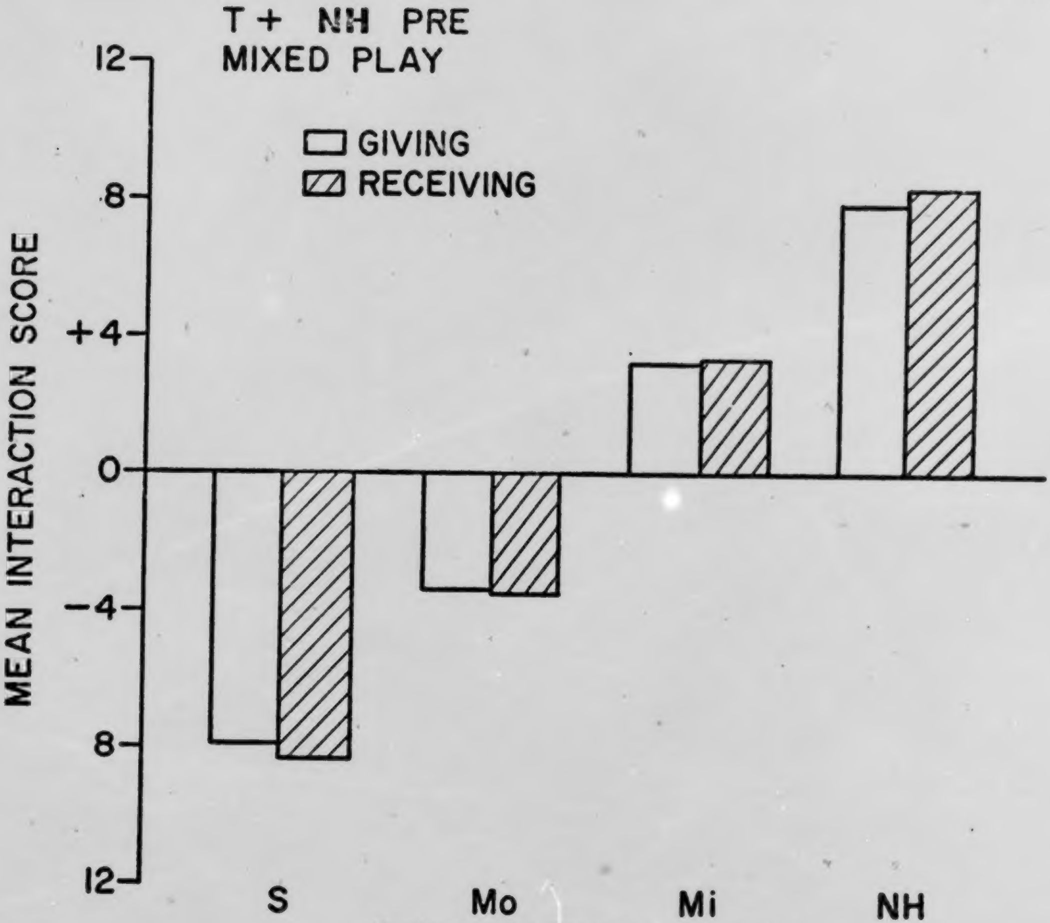

T + NH PRE
MIXED PLAY
GIVING
RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 36

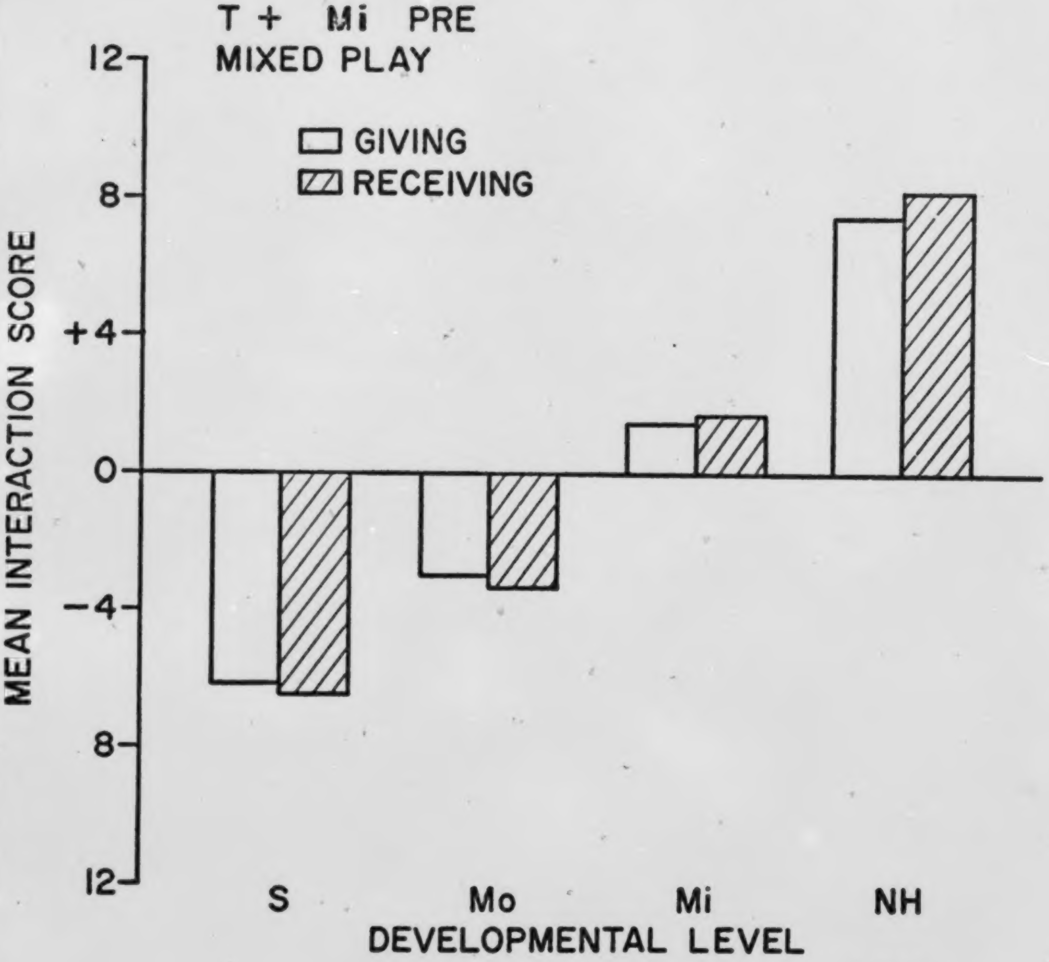

T + Mi PRE
MIXED PLAY
☐ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 37

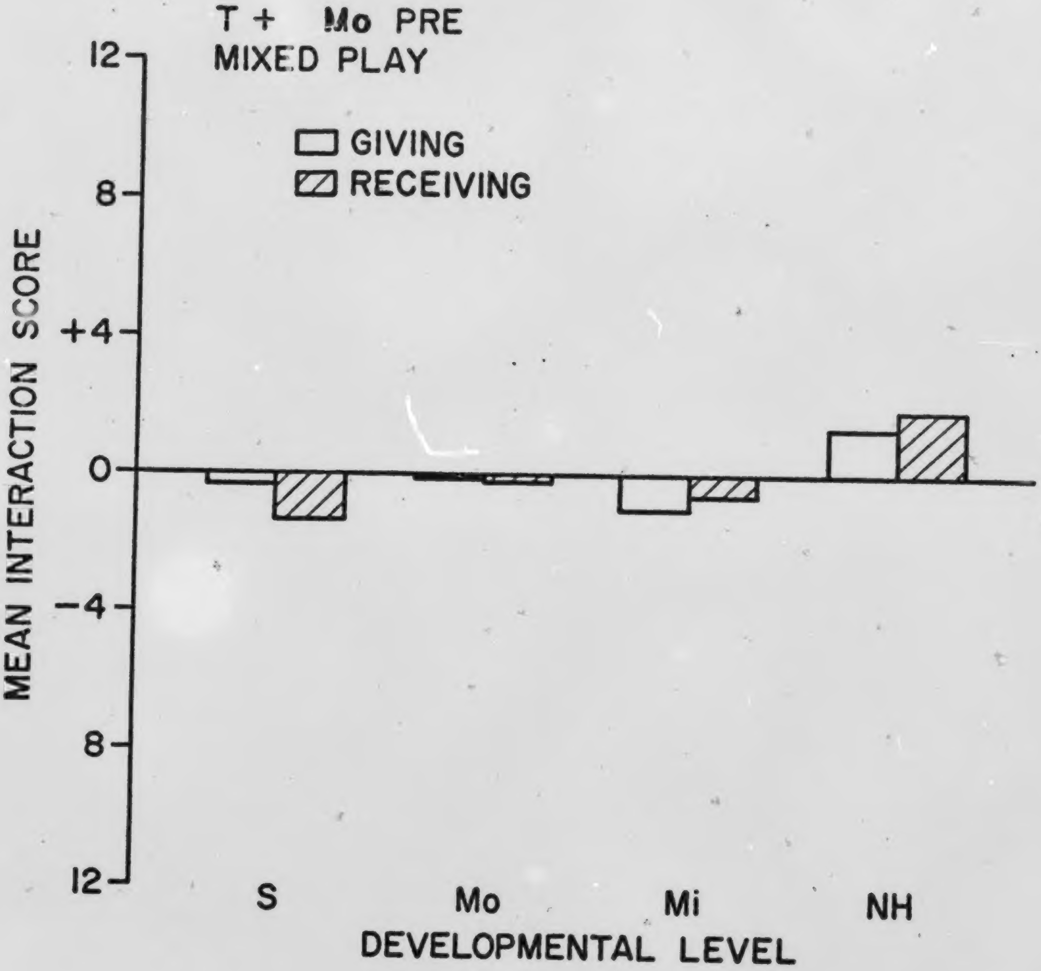

T + Mo PRE
MIXED PLAY
GIVING
RECEIVING
12
8
+4
0
-4
8
12
MEAN INTERACTION SCORE
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 38

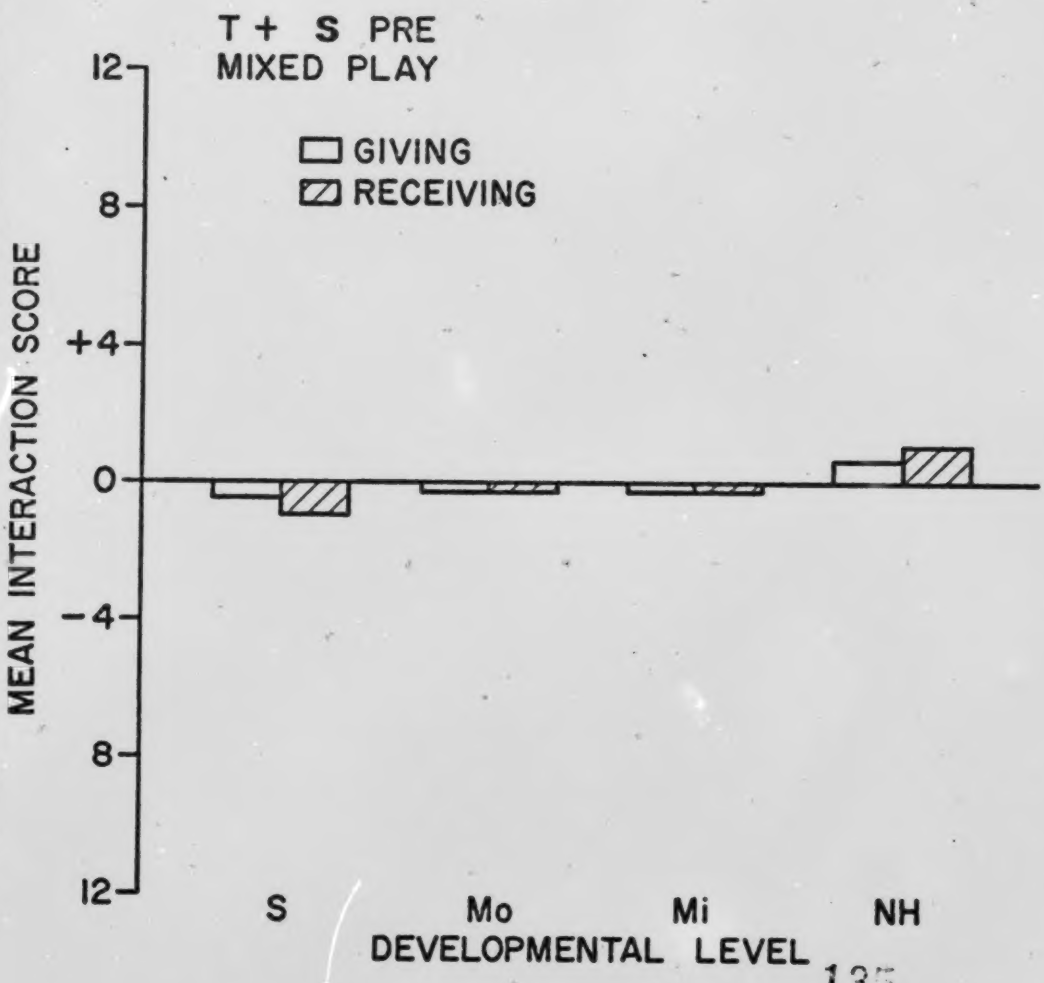

T + S PRE
MIXED PLAY
☐ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 39

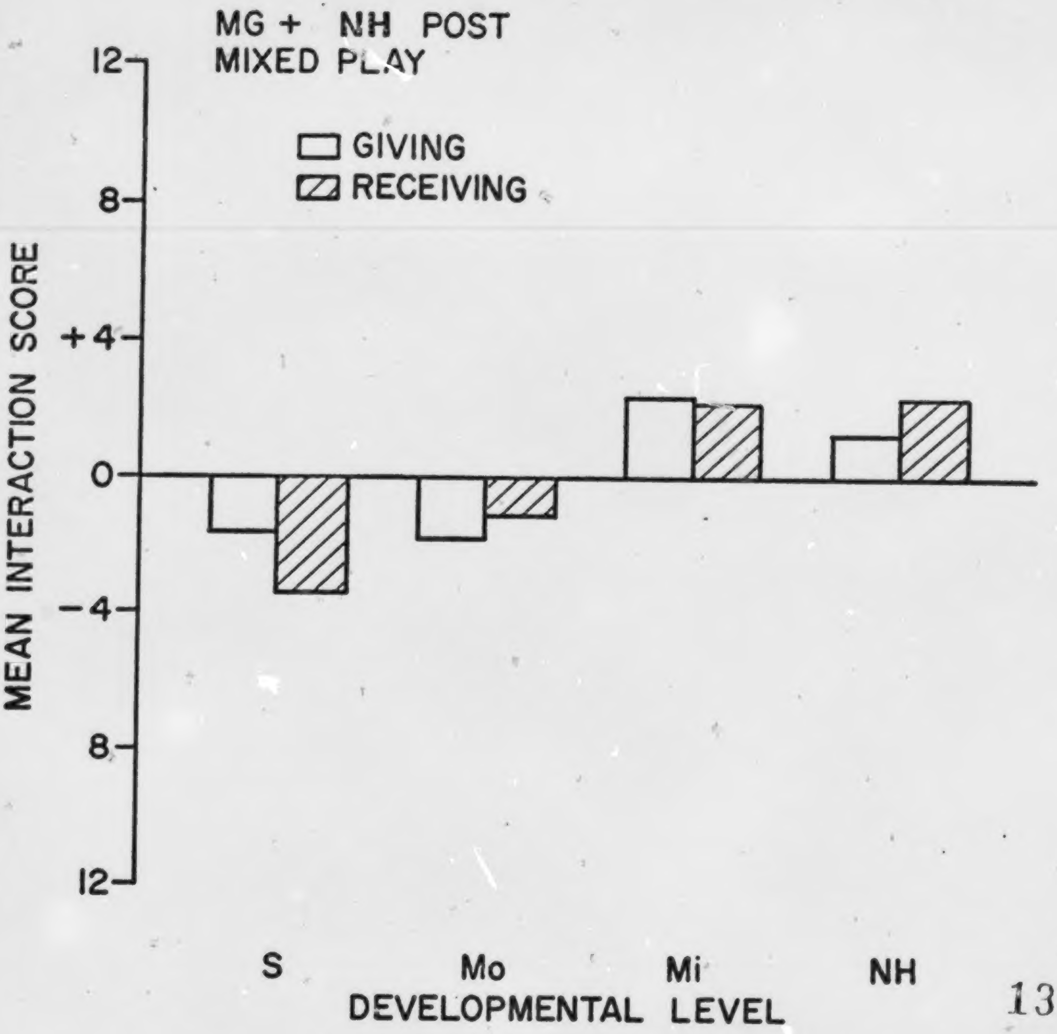

MG + NH POST
MIXED PLAY
GIVING
RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 40

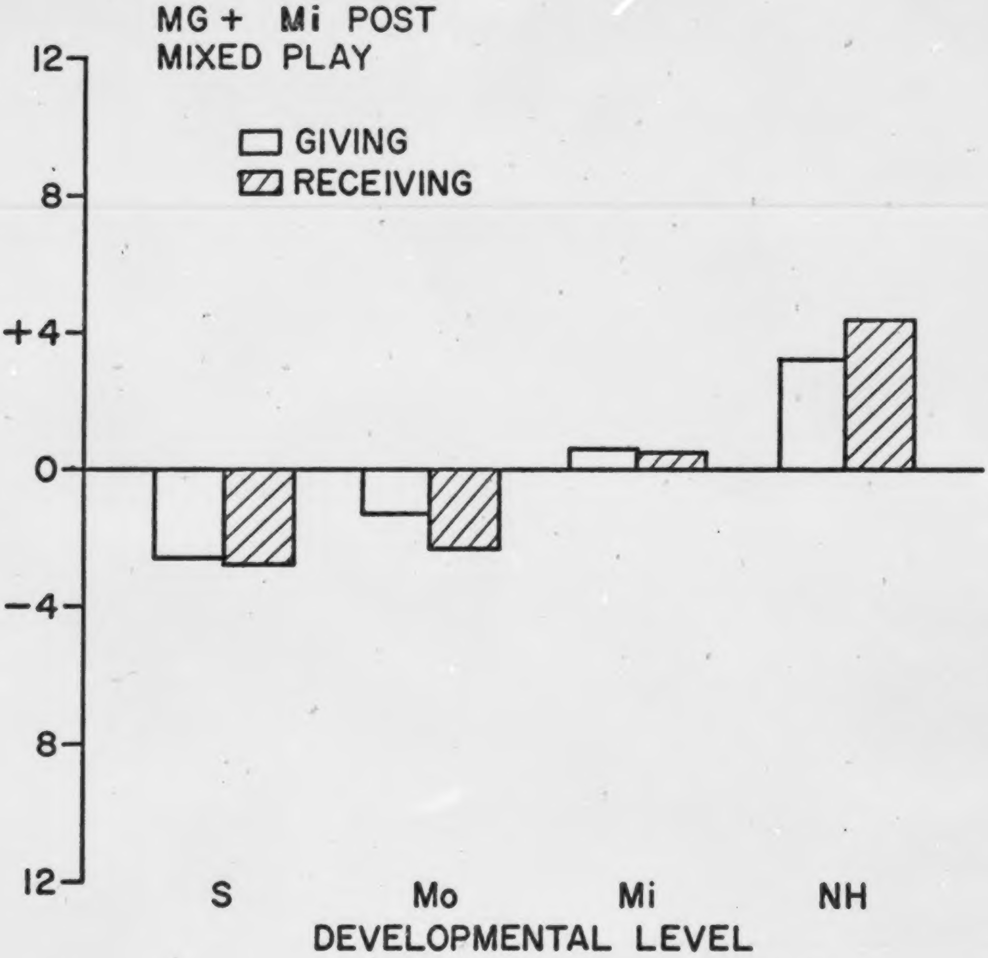
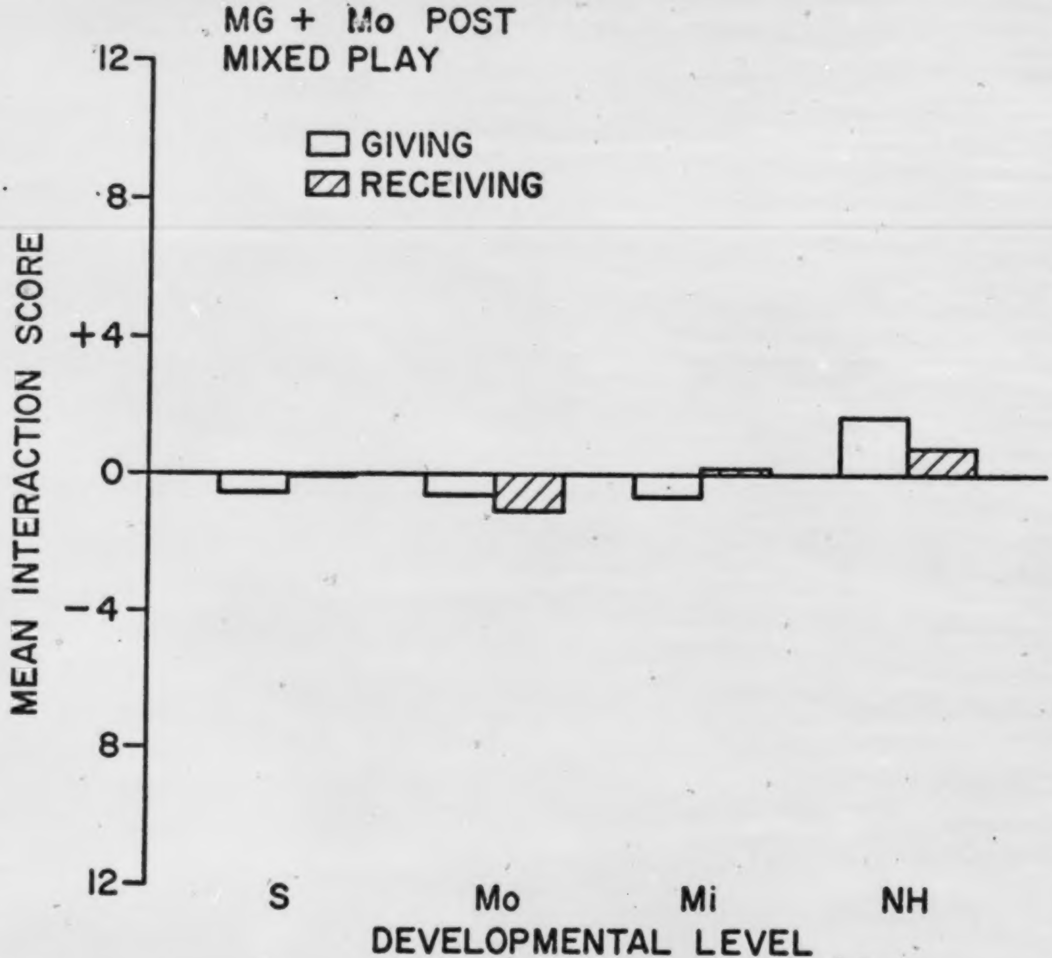

MG + Mi POST
MIXED PLAY
☐ GIVING
▨ RECEIVING
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 41


MG + Mo POST
MIXED PLAY
GIVING
RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

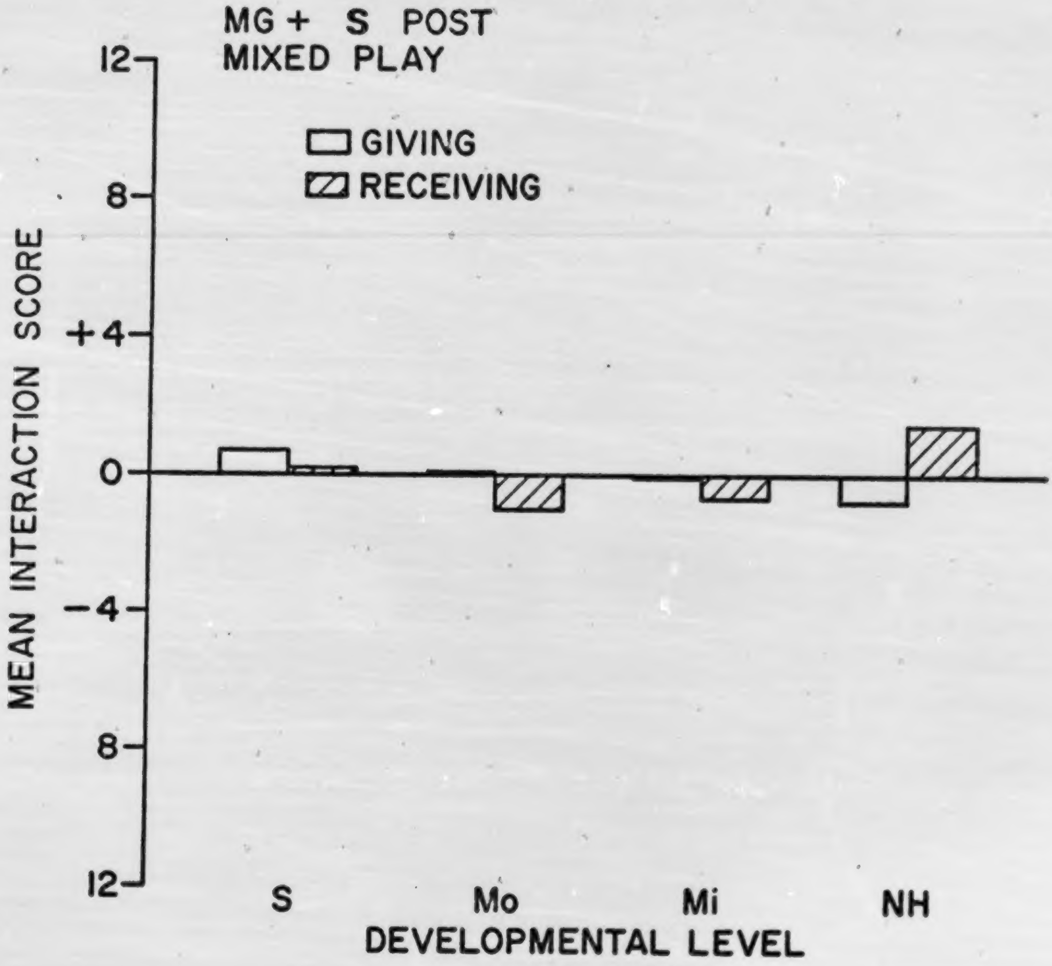

MG + S POST
MIXED PLAY
GIVING
RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 43

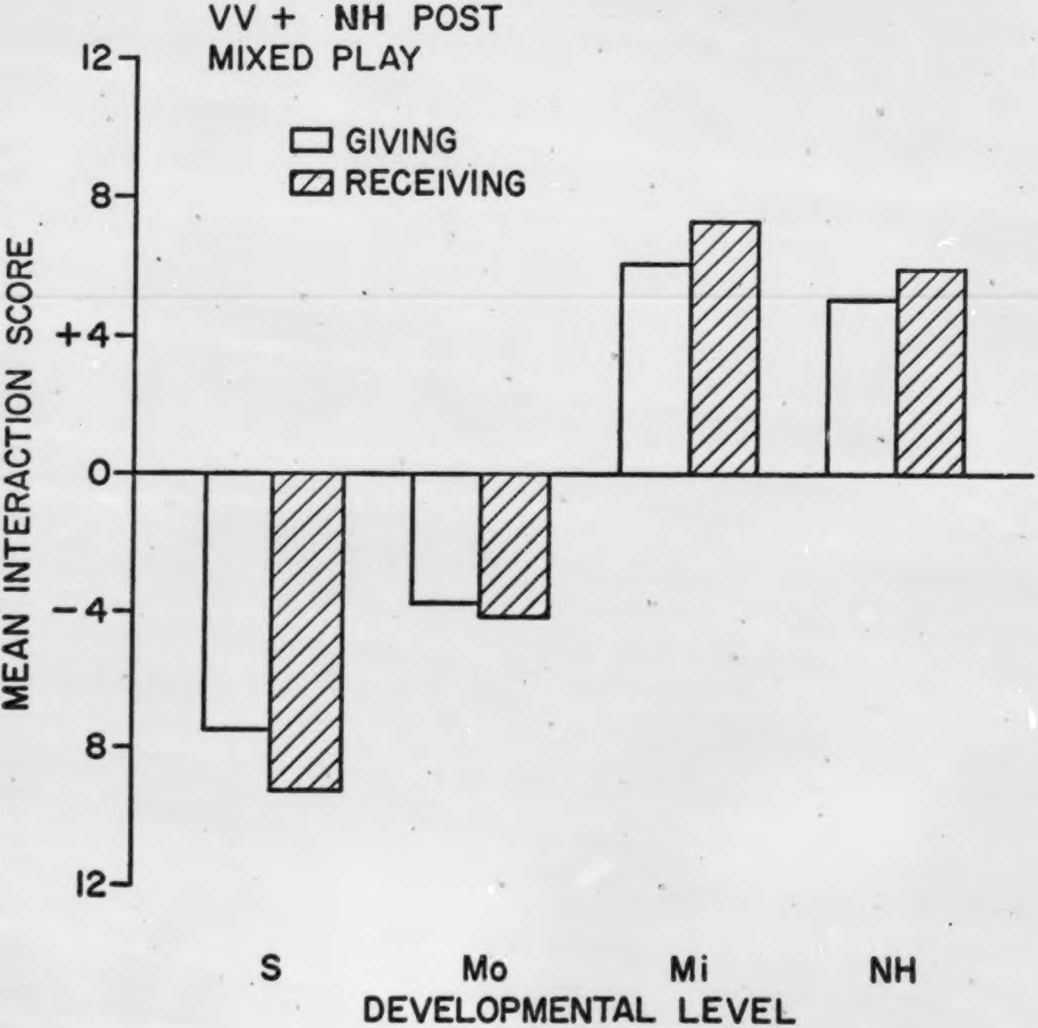

VV + NH POST
MIXED PLAY
GIVING
RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 44

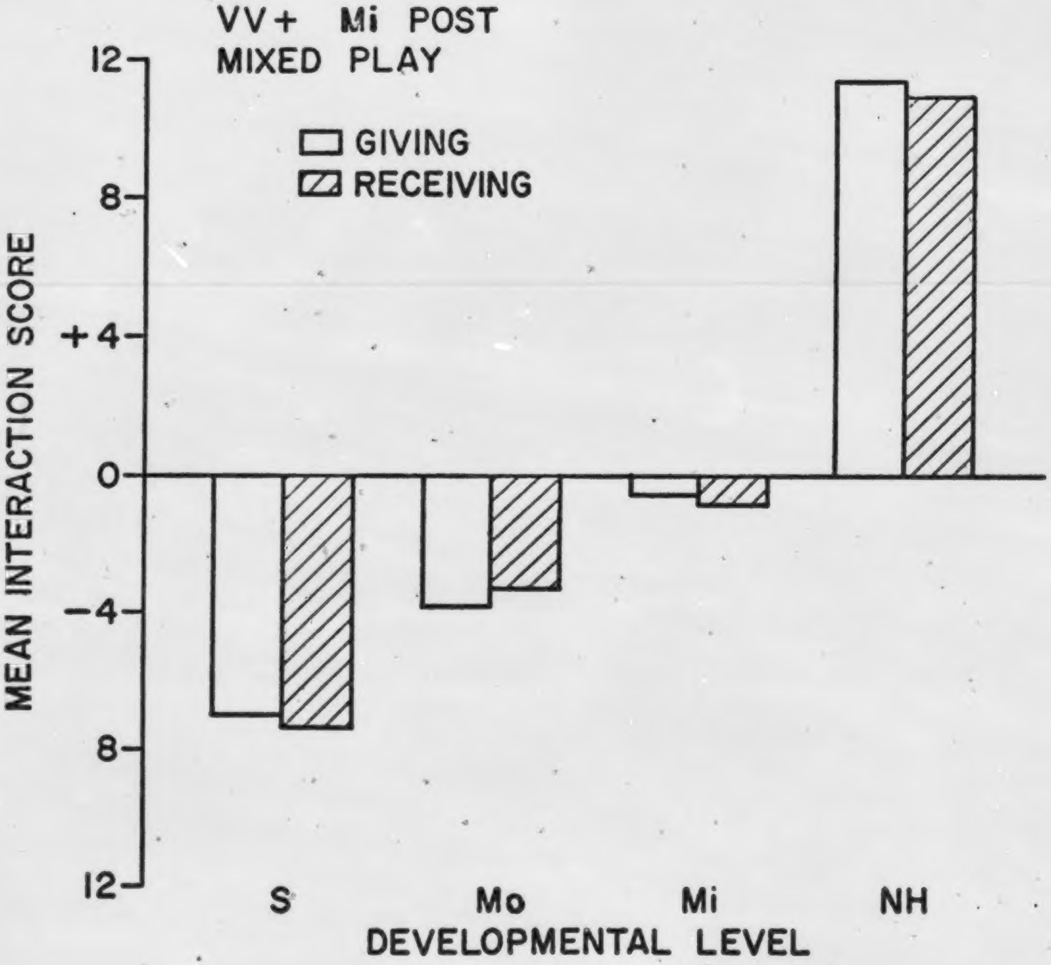

VV+ Mi POST
MIXED PLAY
GIVING
RECEIVING
12
8
+4
0
-4
8
12
MEAN INTERACTION SCORE
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 45

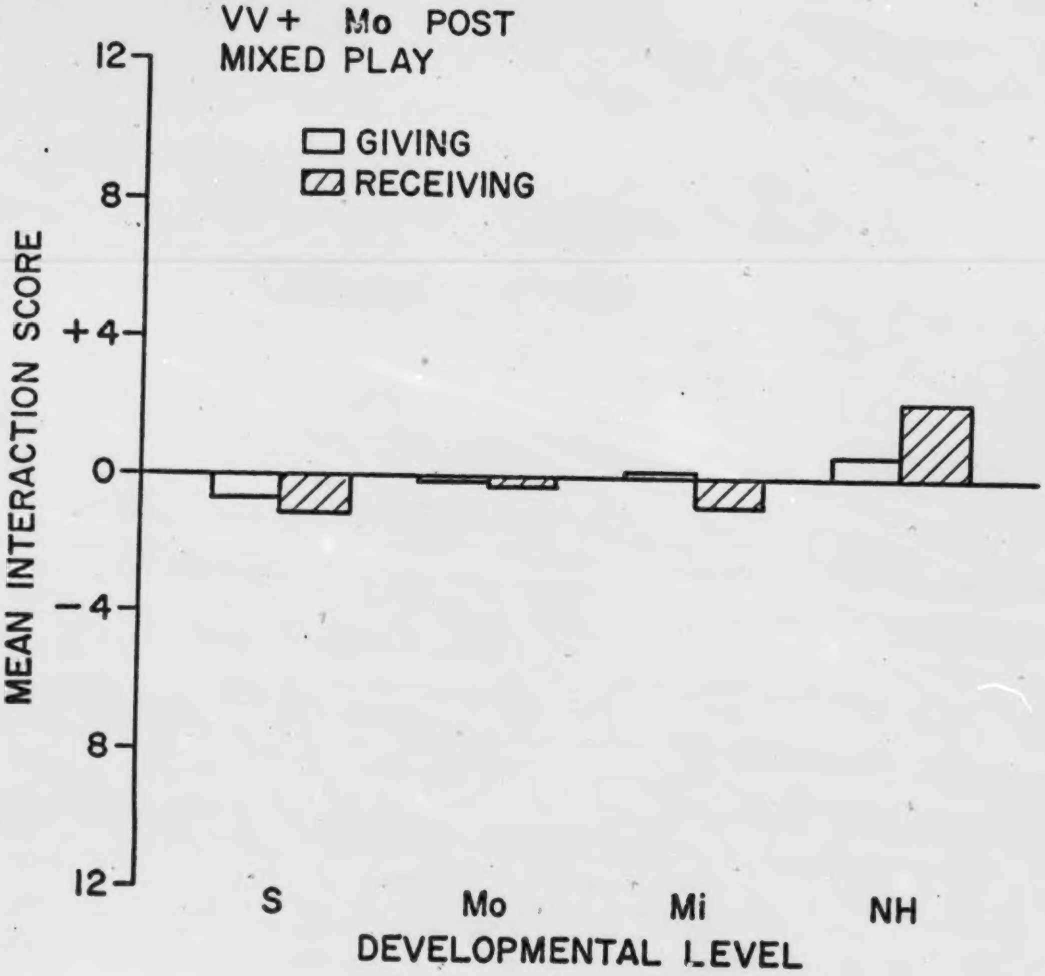

VV + Mo POST
MIXED PLAY
GIVING
RECEIVING
12
8
+4
0
-4
8
12
MEAN INTERACTION SCORE
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 46

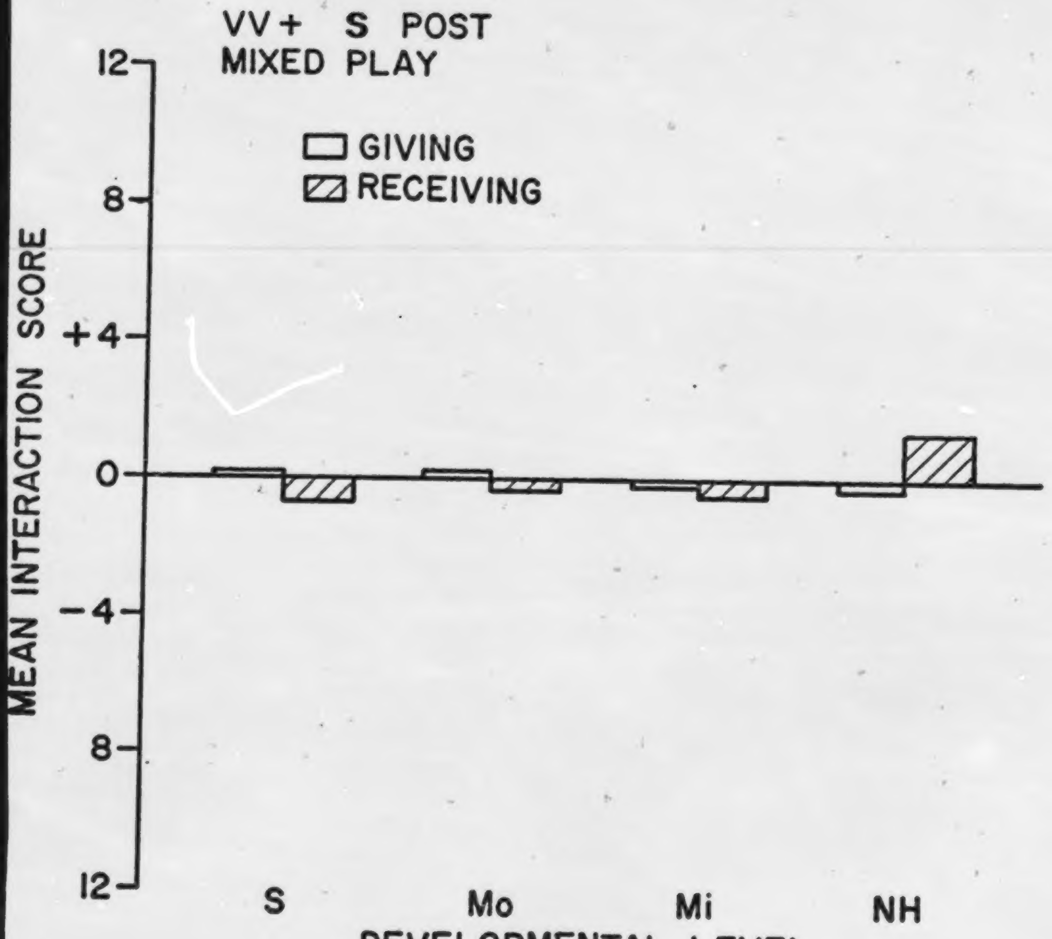

VV + S POST
MIXED PLAY
GIVING
RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 47

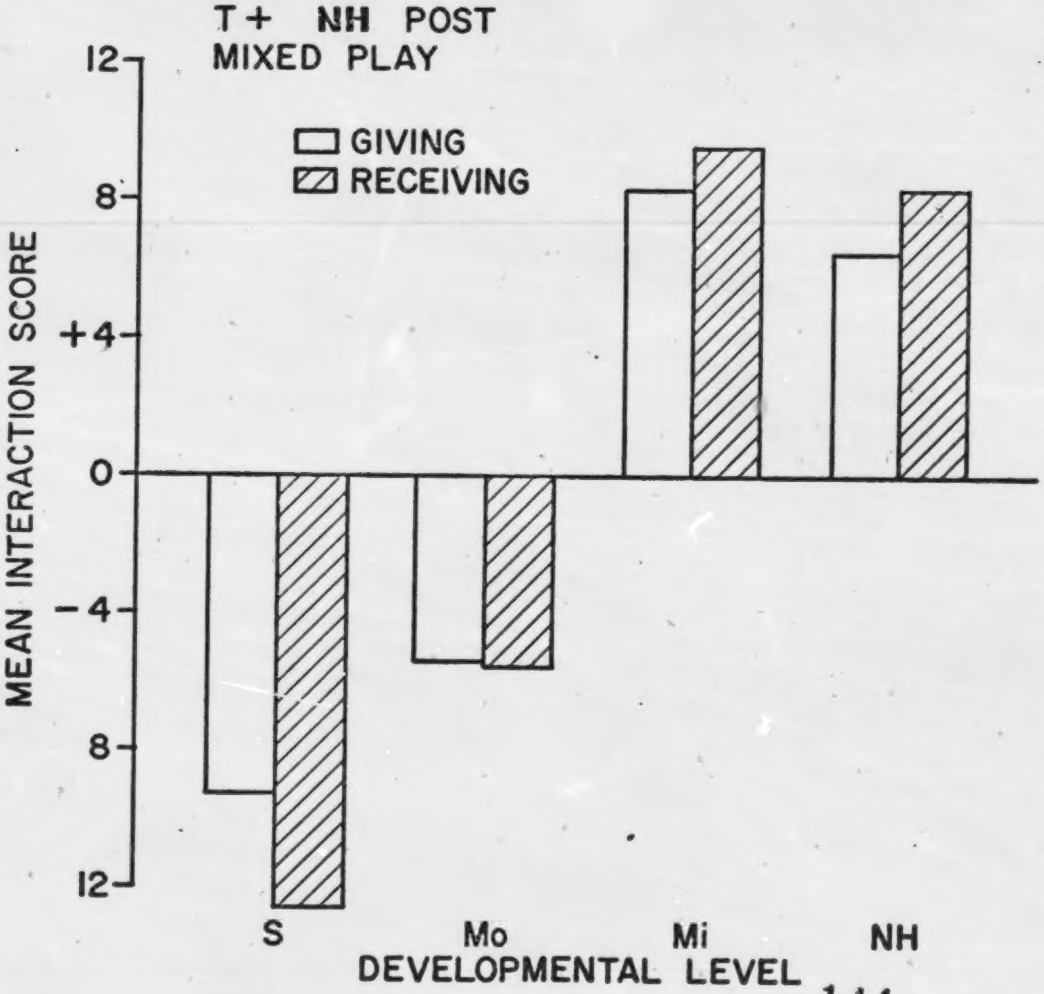
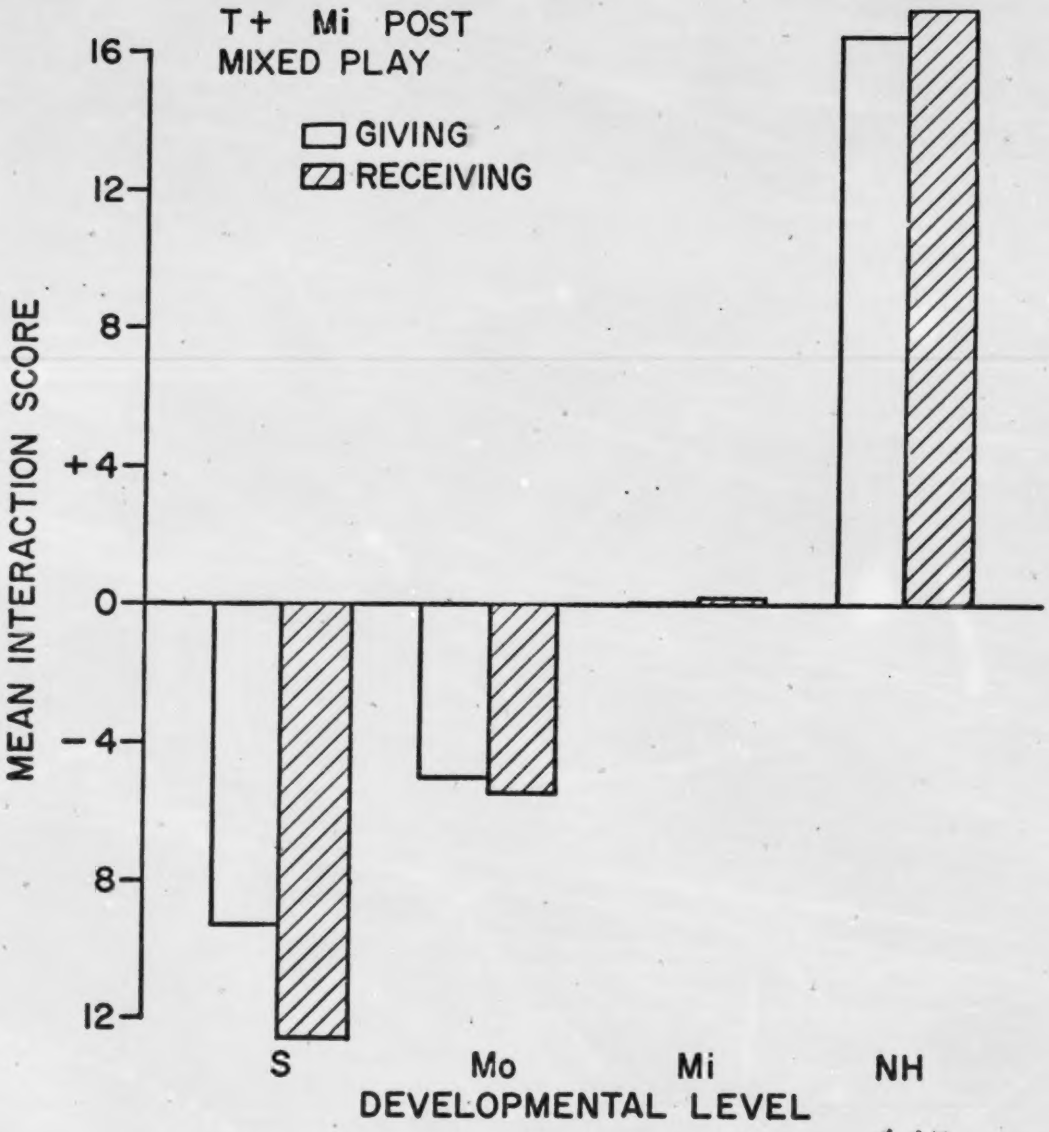

T+ NH POST
MIXED PLAY
GIVING
RECEIVING
12
8
+4
0
-4
8
12
MEAN INTERACTION SCORE
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 48


T+ Mi POST
MIXED PLAY
GIVING
RECEIVING
MEAN INTERACTION SCORE
16
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

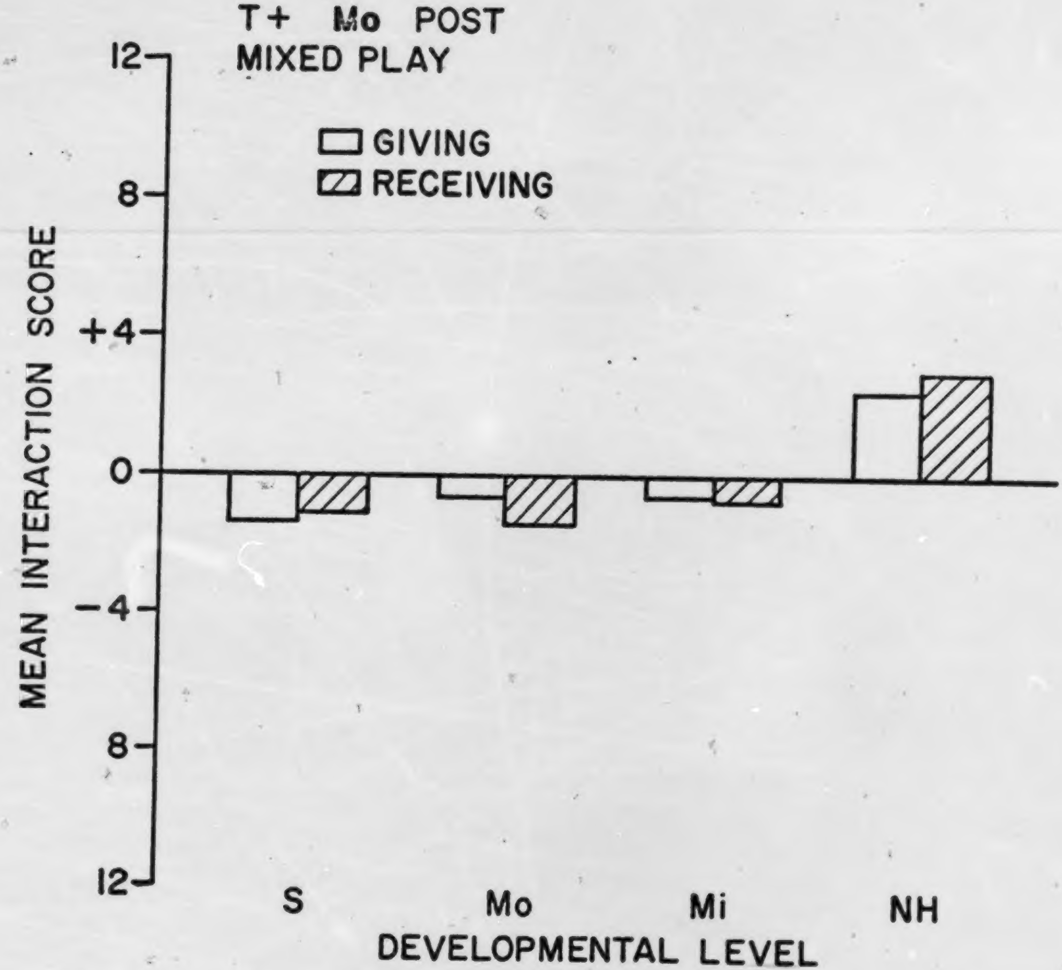
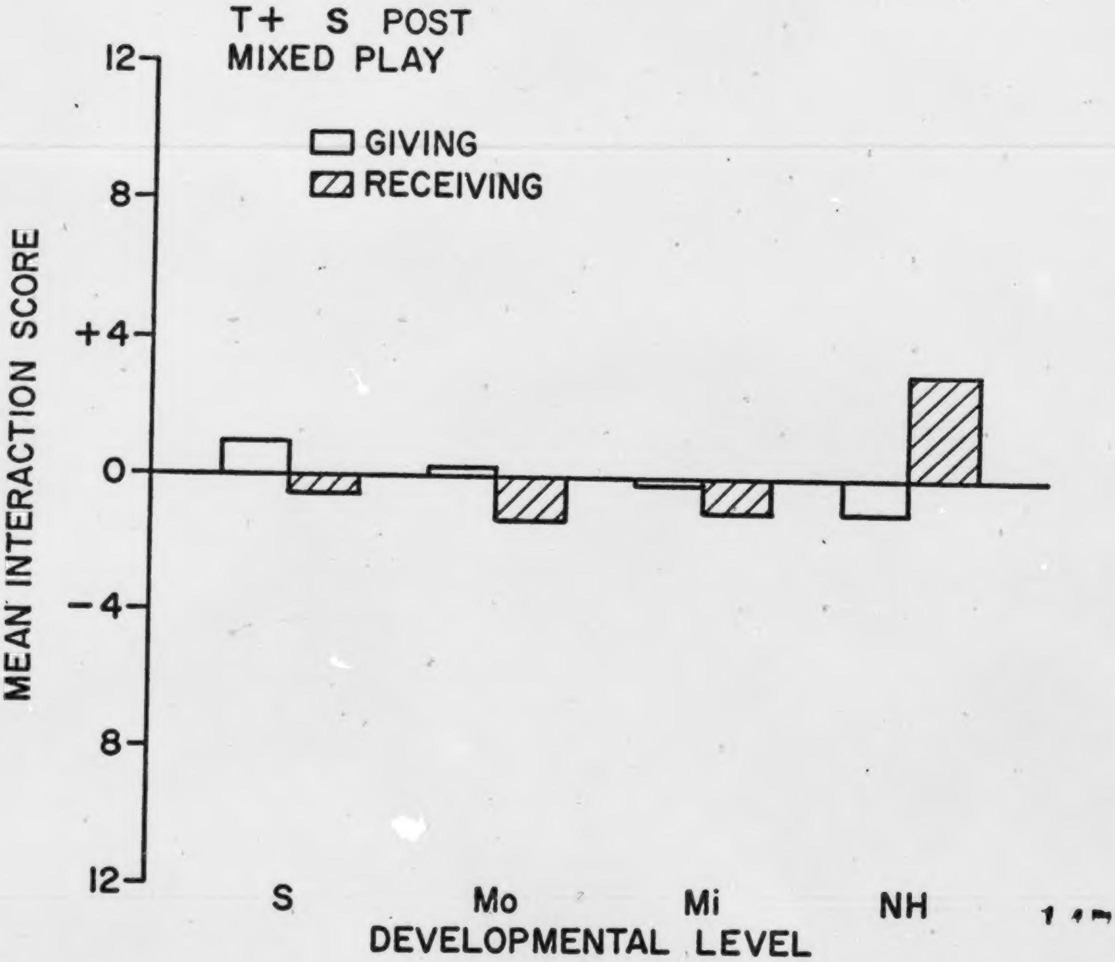
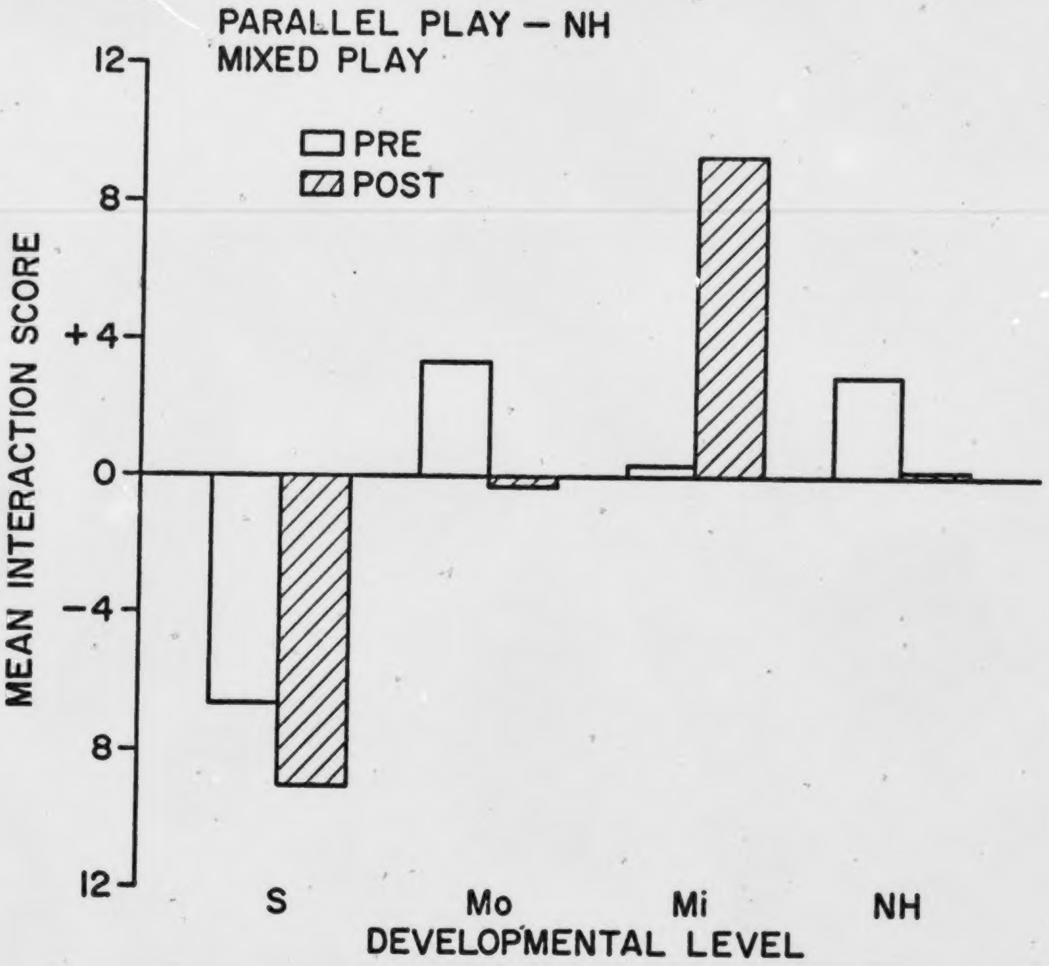

T+ Mo POST
MIXED PLAY
GIVING
RECEIVING
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 50


T+ S POST
MIXED PLAY
GIVING
RECEIVING
12
8
+4
0
-4
8
12
MEAN INTERACTION SCORE
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

147


PARALLEL PLAY — NH
MIXED PLAY
PRE
POST
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

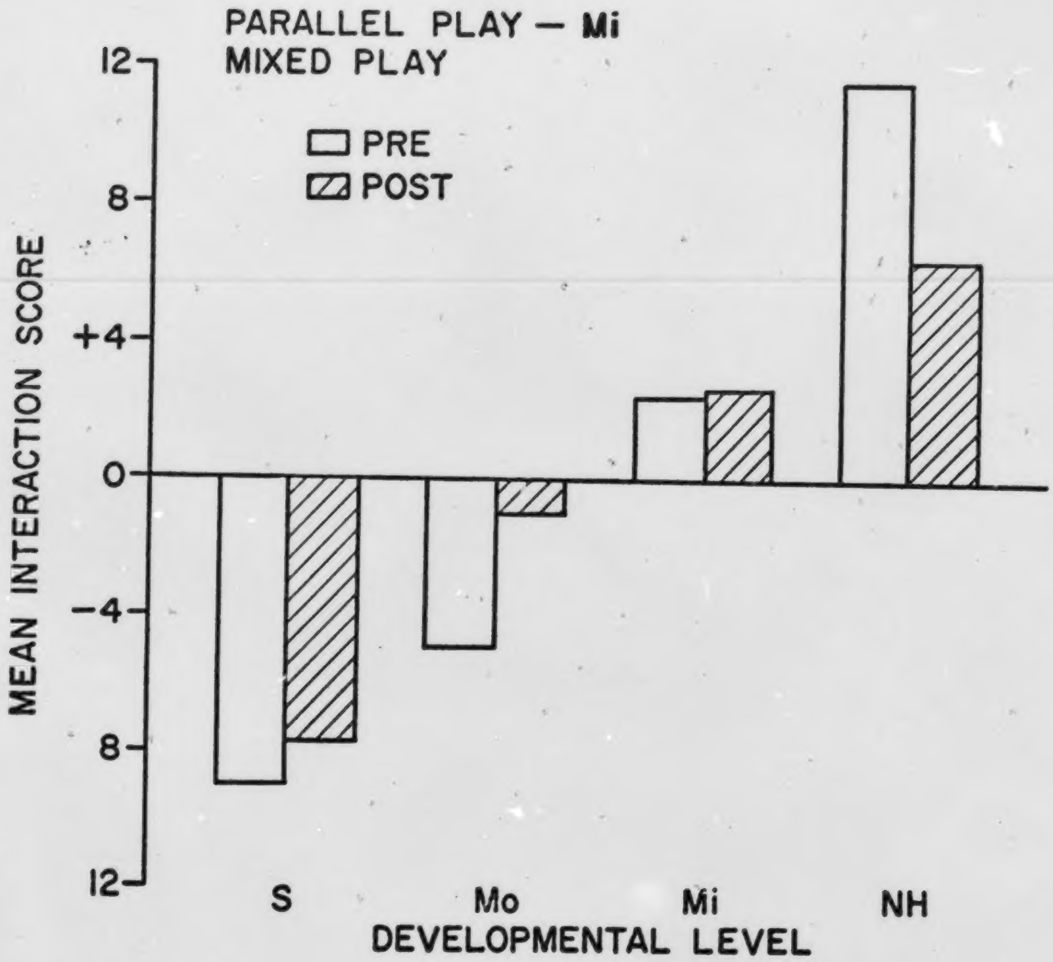

PARALLEL PLAY — Mi
MIXED PLAY
☐ PRE
▨ POST
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 53

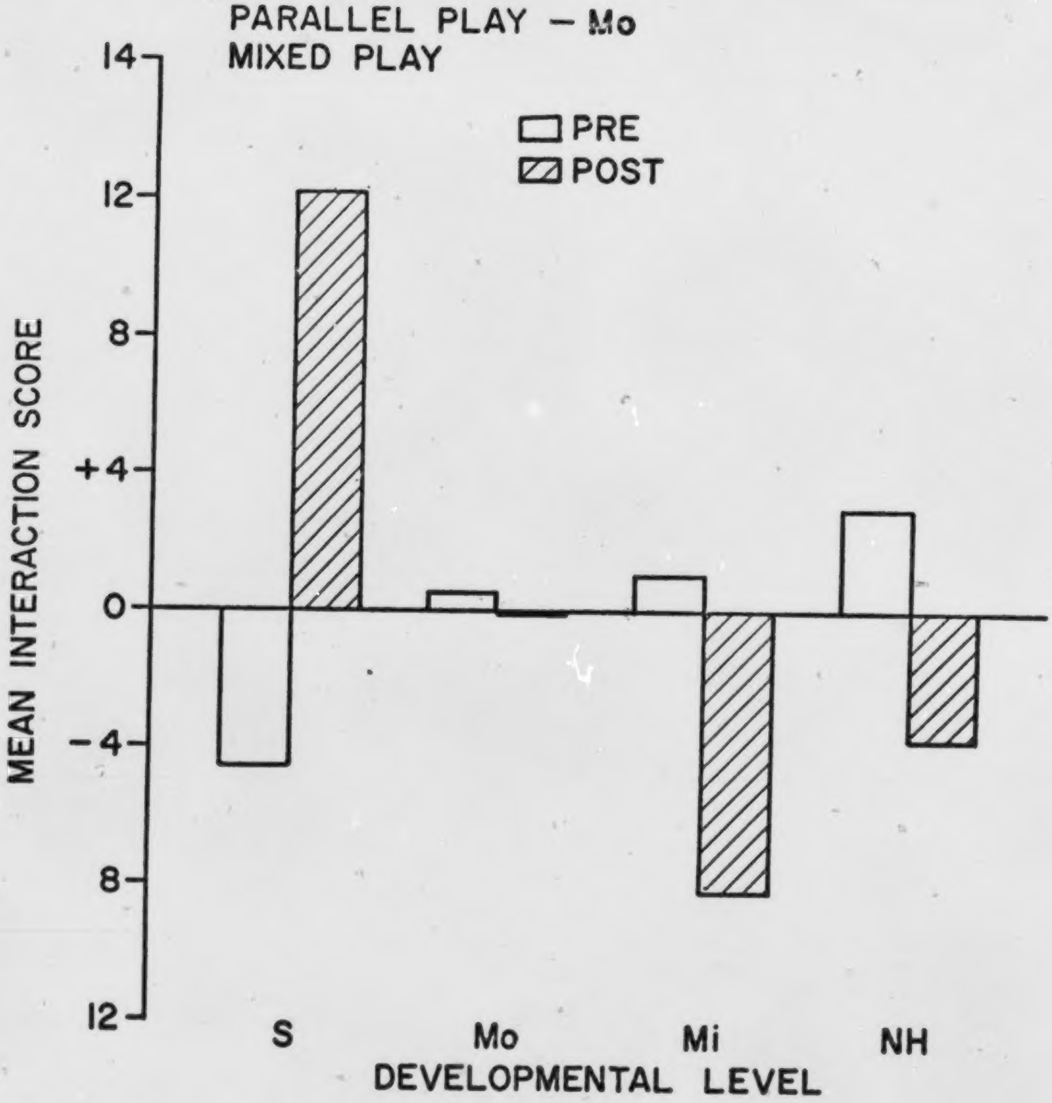

PARALLEL PLAY — Mo
MIXED PLAY

Fig. 54

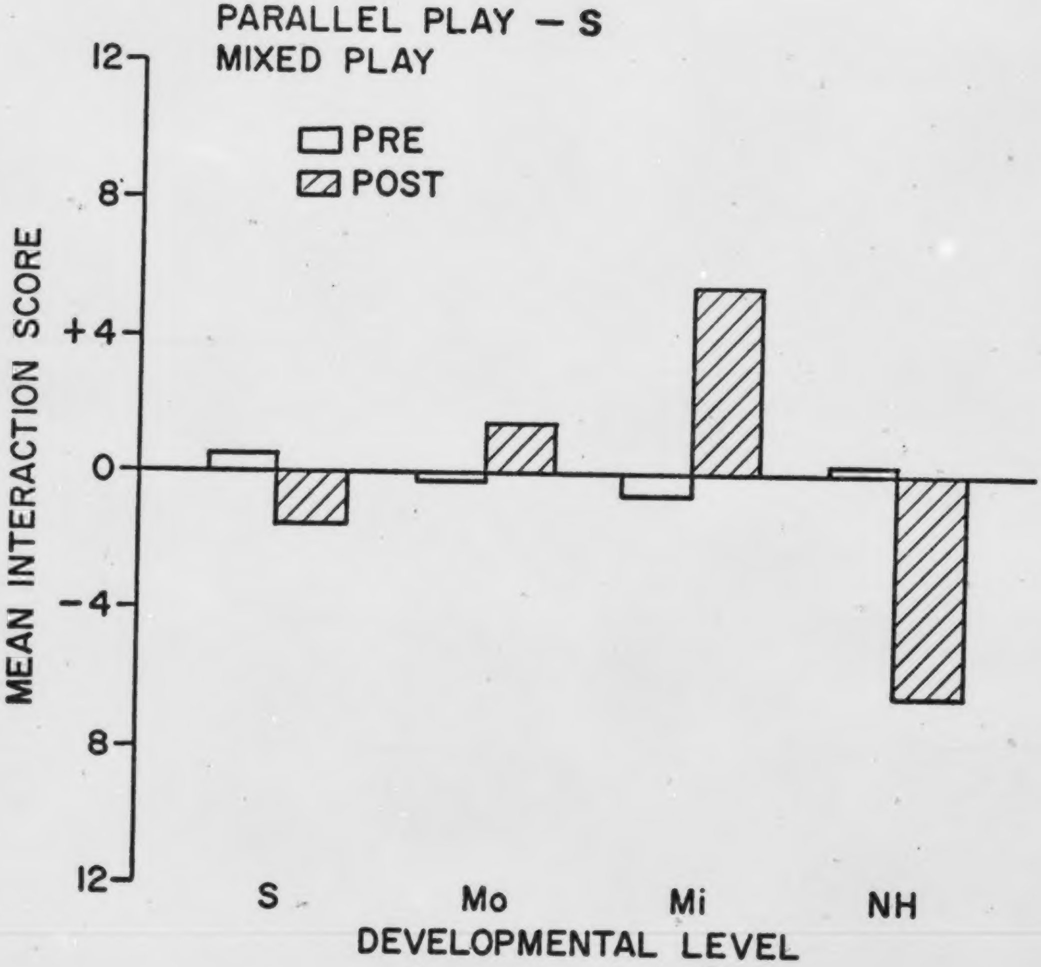

PARALLEL PLAY — S
MIXED PLAY
PRE
POST
MEAN INTERACTION SCORE
12
8
+4
0
-4
8
12
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 55

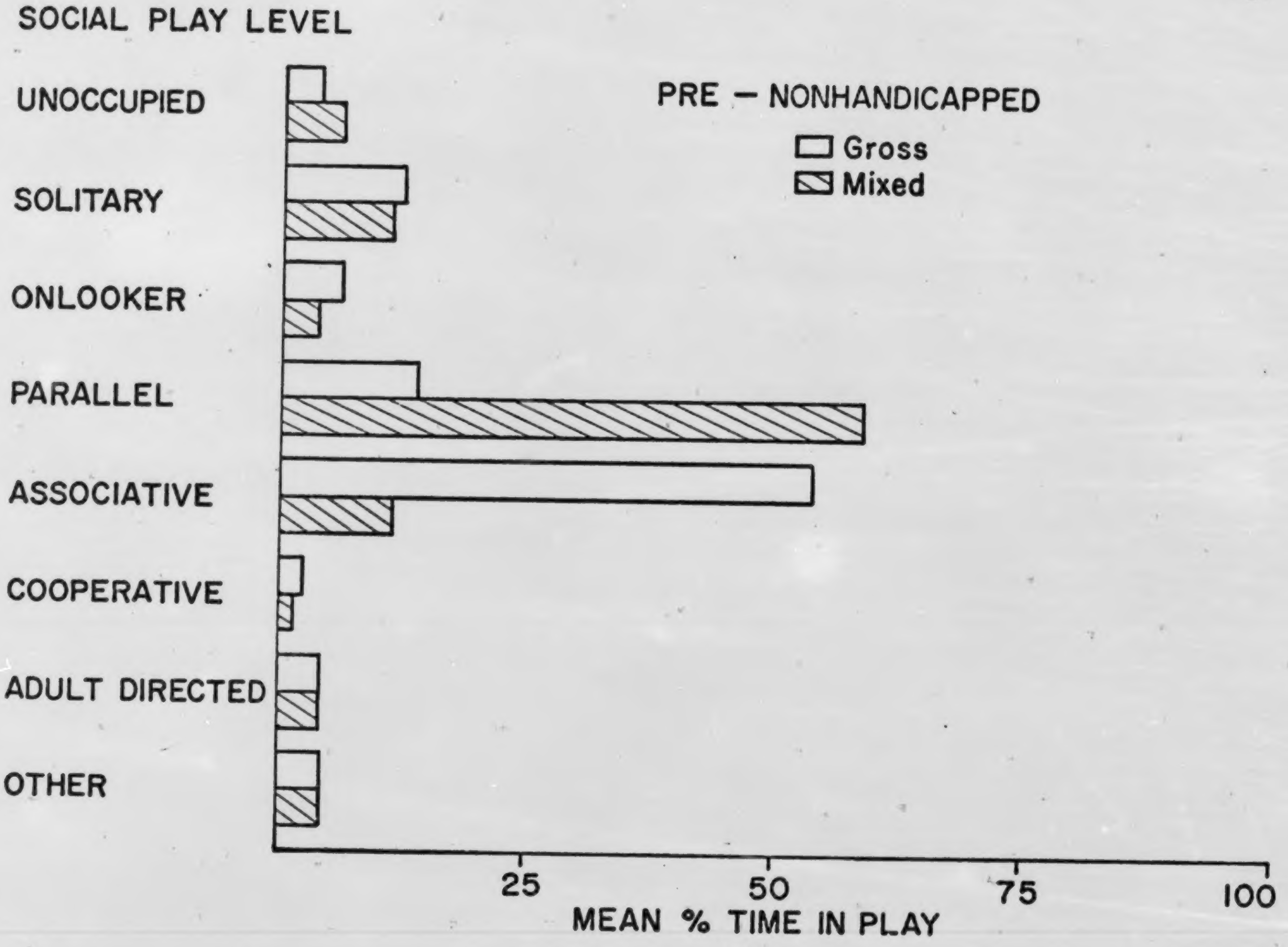

SOCIAL PLAY LEVEL
UNOCCUPIED
SOLITARY
ONLOOKER
PARALLEL
ASSOCIATIVE
COOPERATIVE
ADULT DIRECTED
OTHER
PRE — NONHANDICAPPED
☐ Gross
▨ Mixed
25
50
75
100
MEAN % TIME IN PLAY

Fig. 56

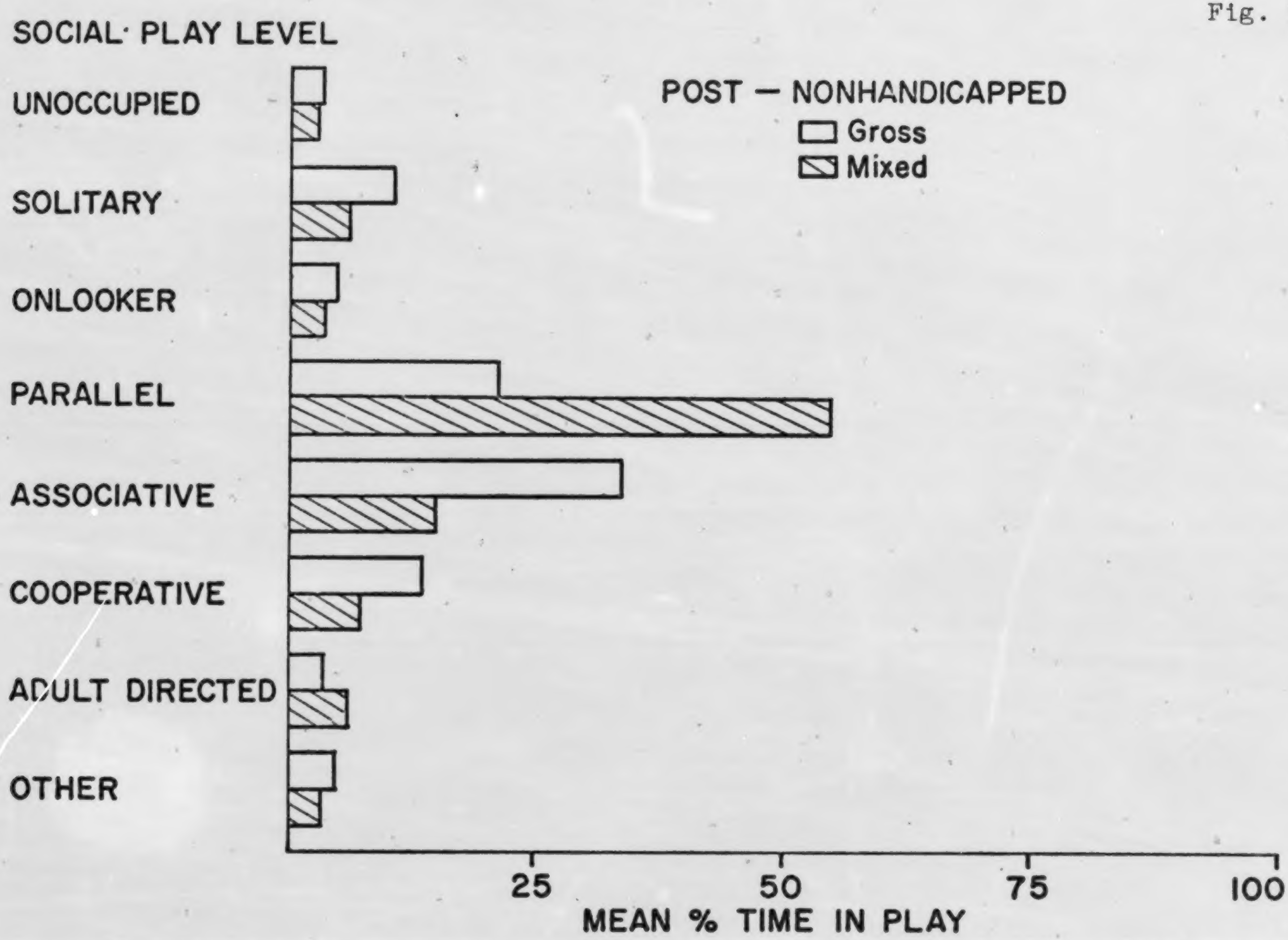

SOCIAL PLAY LEVEL
UNOCCUPIED
SOLITARY
ONLOOKER
PARALLEL
ASSOCIATIVE
COOPERATIVE
ADULT DIRECTED
OTHER
POST — NONHANDICAPPED
Gross
Mixed
25
50
75
100
MEAN % TIME IN PLAY

Fig. 57

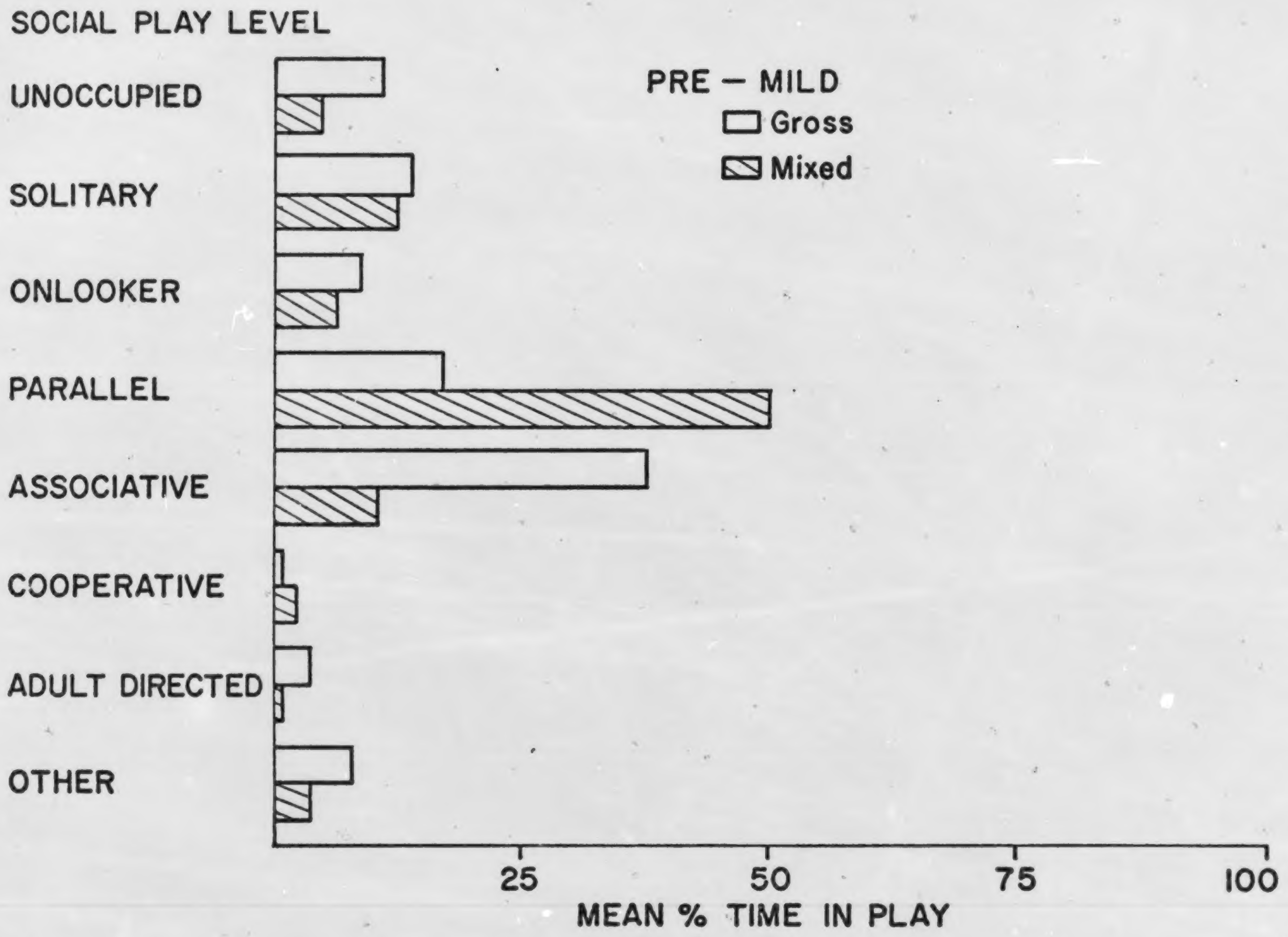

SOCIAL PLAY LEVEL
UNOCCUPIED
SOLITARY
ONLOOKER
PARALLEL
ASSOCIATIVE
COOPERATIVE
ADULT DIRECTED
OTHER
PRE – MILD
☐ Gross
▨ Mixed
25
50
75
100
MEAN % TIME IN PLAY

Fig. 58

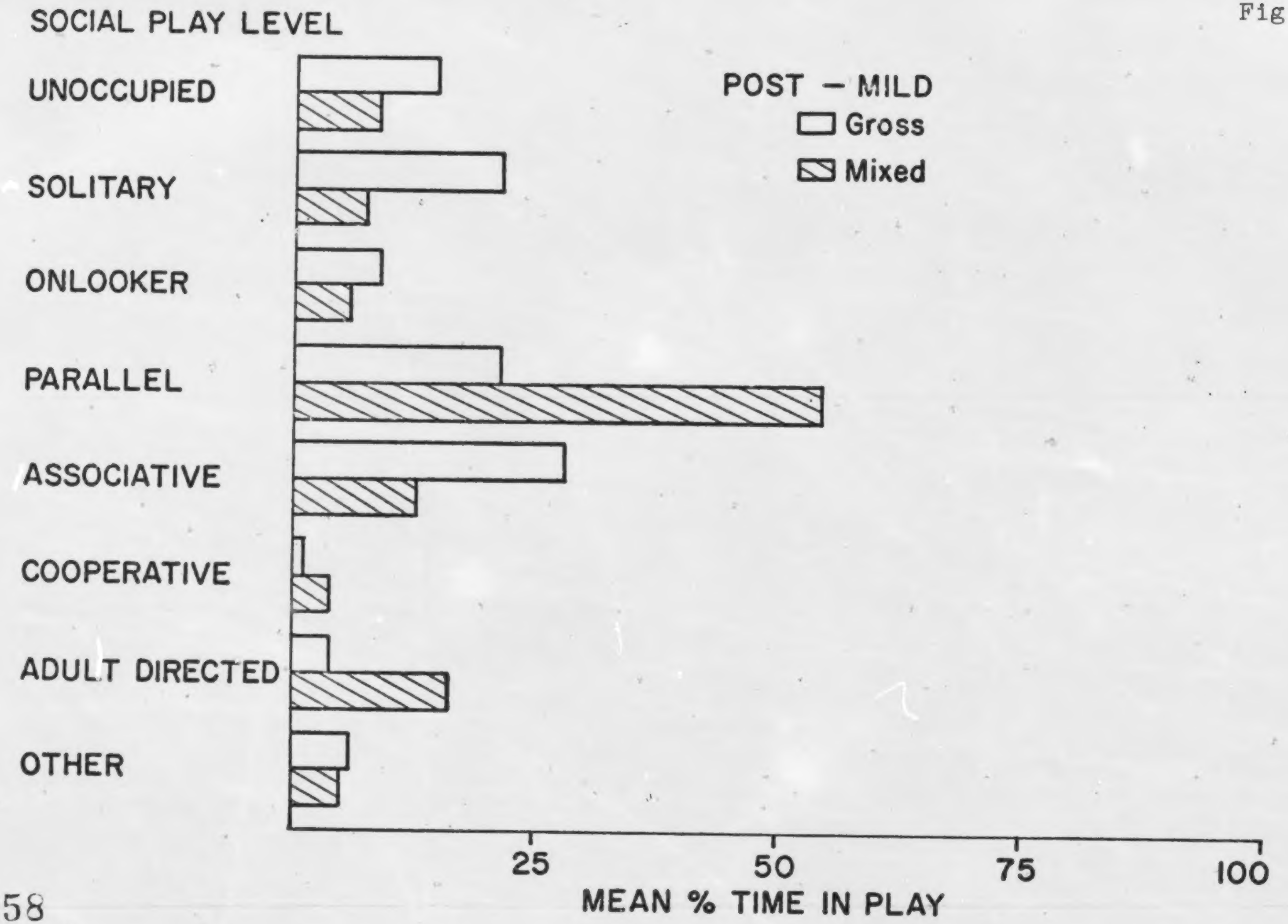

SOCIAL PLAY LEVEL
UNOCCUPIED
SOLITARY
ONLOOKER
PARALLEL
ASSOCIATIVE
COOPERATIVE
ADULT DIRECTED
OTHER
POST – MILD
Gross
Mixed
25
50
75
100
MEAN % TIME IN PLAY

Fig. 59

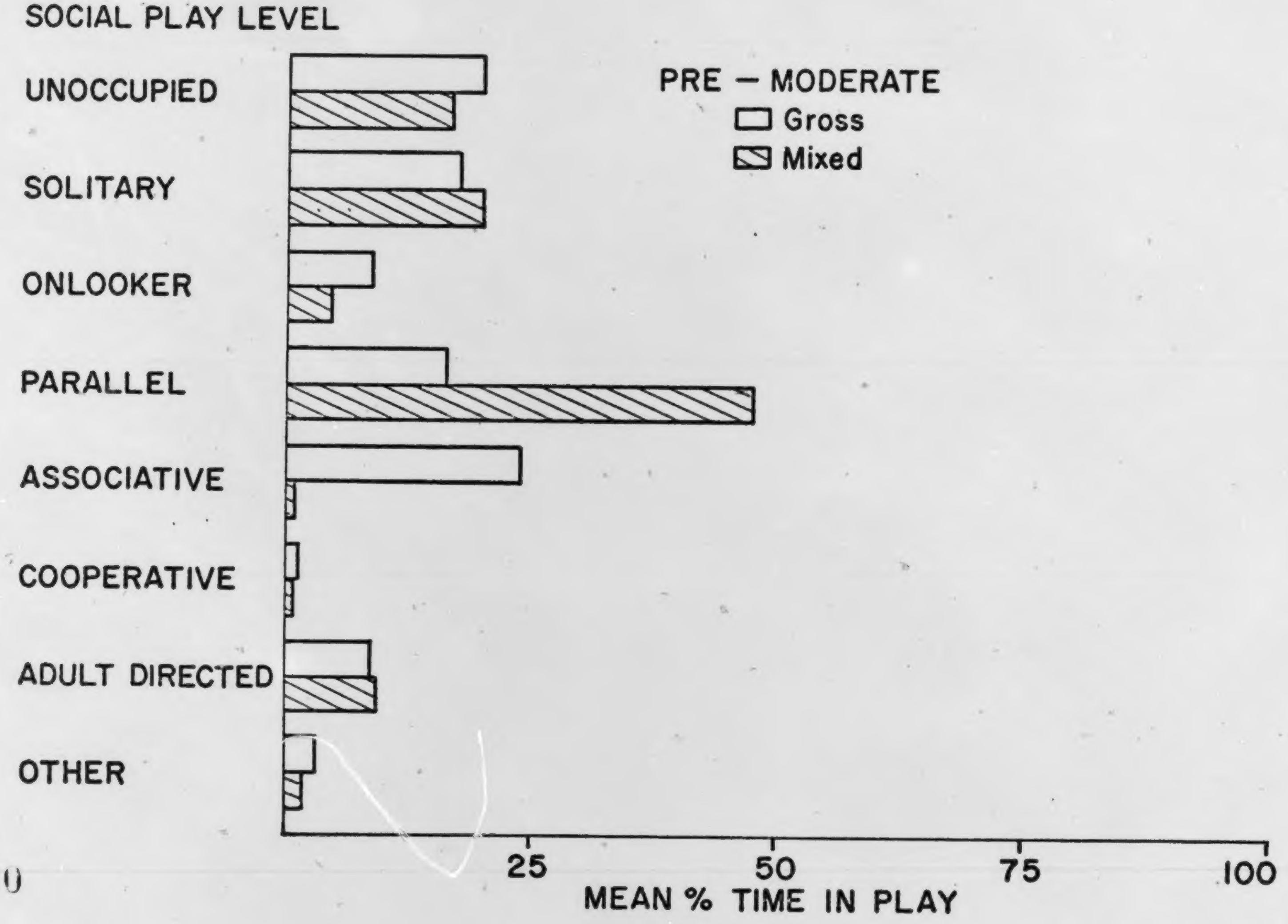

SOCIAL PLAY LEVEL
UNOCCUPIED
SOLITARY
ONLOOKER
PARALLEL
ASSOCIATIVE
COOPERATIVE
ADULT DIRECTED
OTHER
PRE – MODERATE
Gross
Mixed
25
50
75
100
MEAN % TIME IN PLAY

Fig. 60

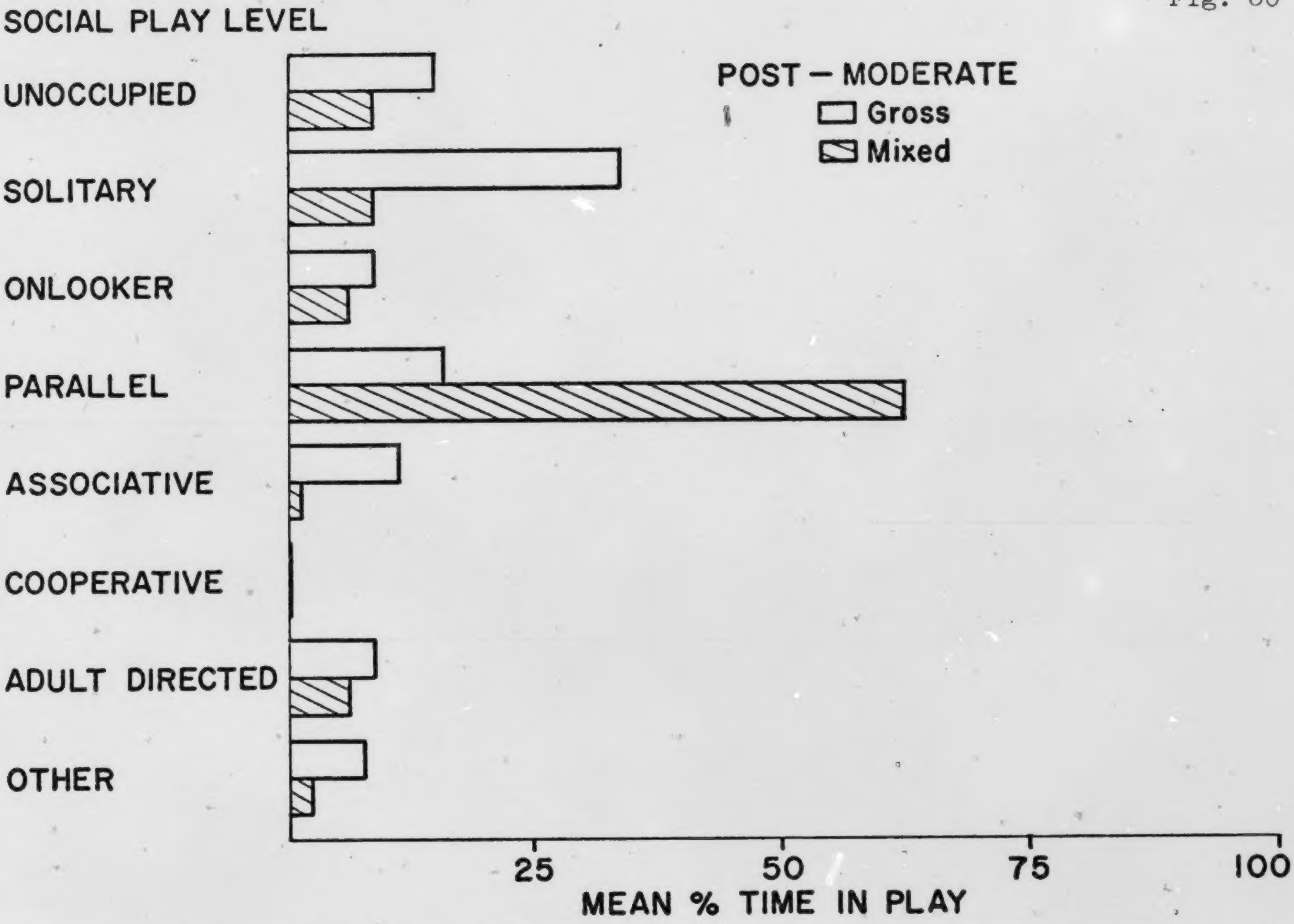

SOCIAL PLAY LEVEL
POST – MODERATE
Gross
Mixed
UNOCCUPIED
SOLITARY
ONLOOKER
PARALLEL
ASSOCIATIVE
COOPERATIVE
ADULT DIRECTED
OTHER
25
50
75
100
MEAN % TIME IN PLAY

Fig. 61

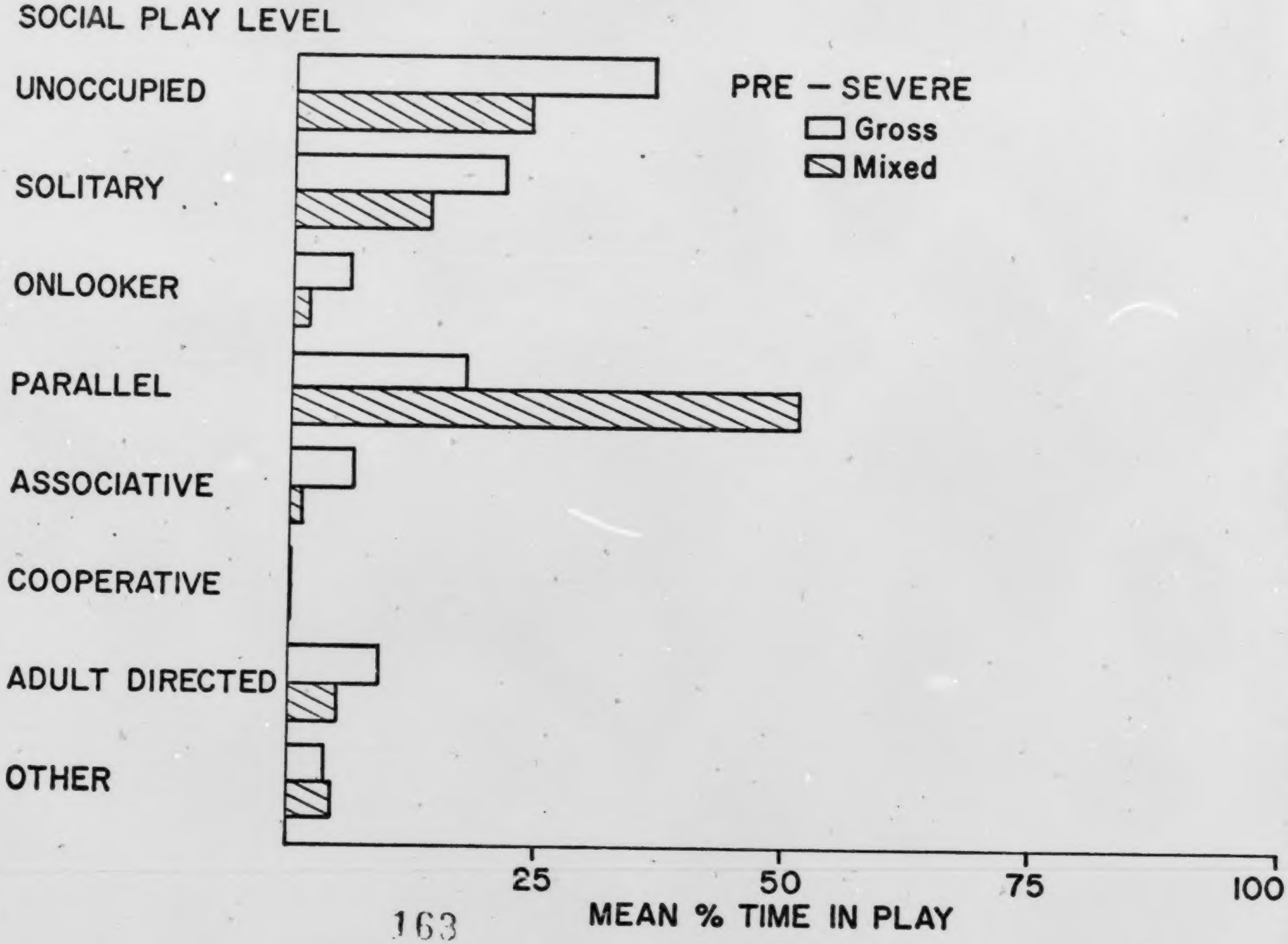

SOCIAL PLAY LEVEL
UNOCCUPIED
SOLITARY
ONLOOKER
PARALLEL
ASSOCIATIVE
COOPERATIVE
ADULT DIRECTED
OTHER
PRE – SEVERE
Gross
Mixed
25
50
75
100
MEAN % TIME IN PLAY

Fig. 62

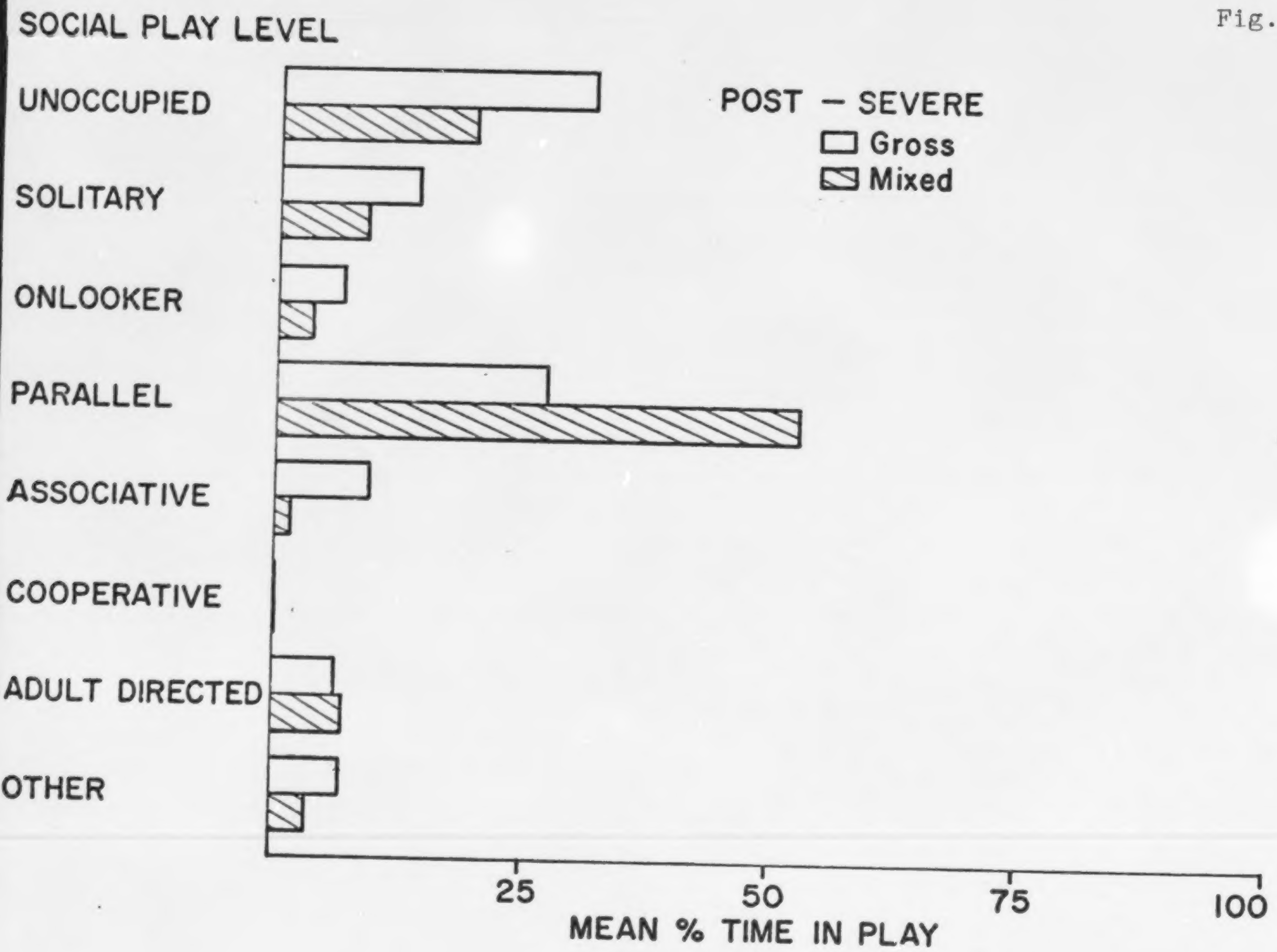

SOCIAL PLAY LEVEL
UNOCCUPIED
SOLITARY
ONLOOKER
PARALLEL
ASSOCIATIVE
COOPERATIVE
ADULT DIRECTED
OTHER
POST – SEVERE
☐ Gross
▨ Mixed
25
50
75
100
MEAN % TIME IN PLAY

Fig. 63

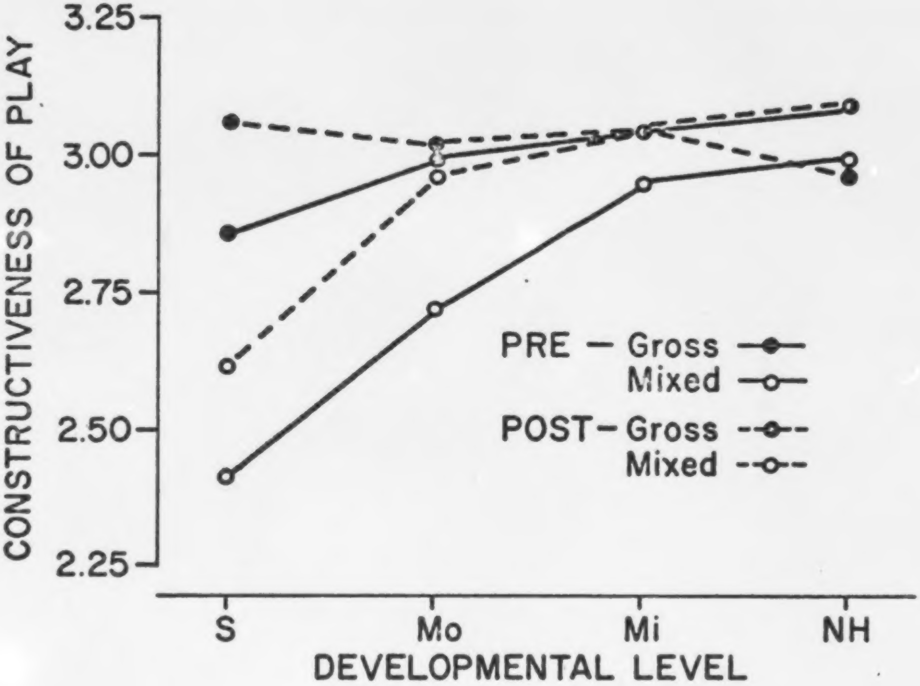
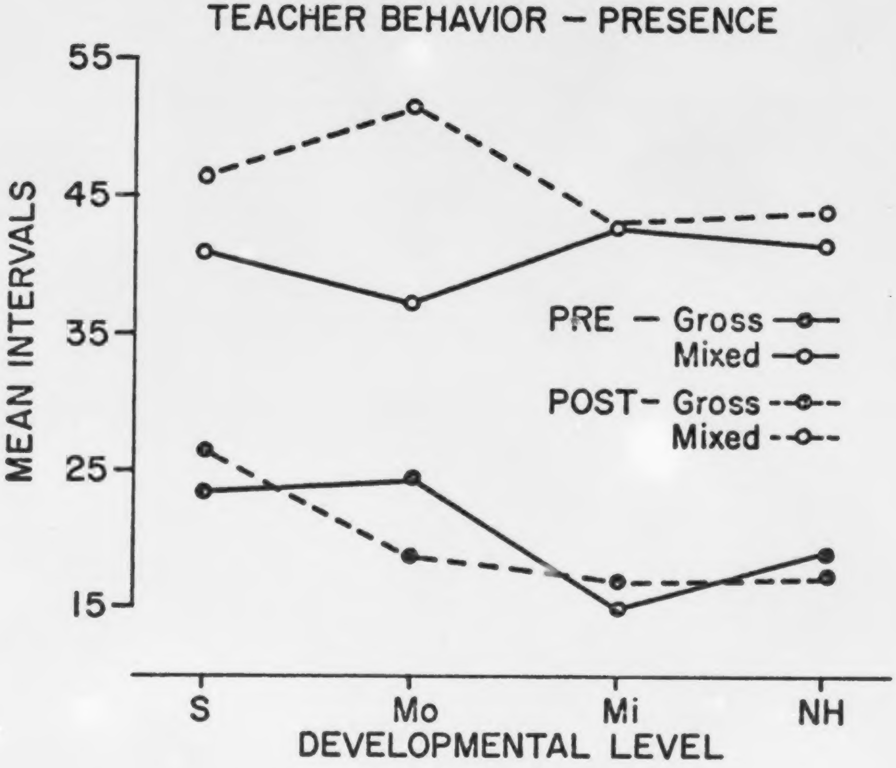

3.25
3.00
2.75
2.50
2.25
CONSTRUCTIVENESS OF PLAY
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL
PRE — Gross —●—
Mixed —○—
POST- Gross --●--
Mixed --○--

Fig. 64


TEACHER BEHAVIOR - PRESENCE
MEAN INTERVALS
55
45
35
25
15
PRE - Gross —●—
Mixed —○—
POST- Gross --●--
Mixed --○--
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

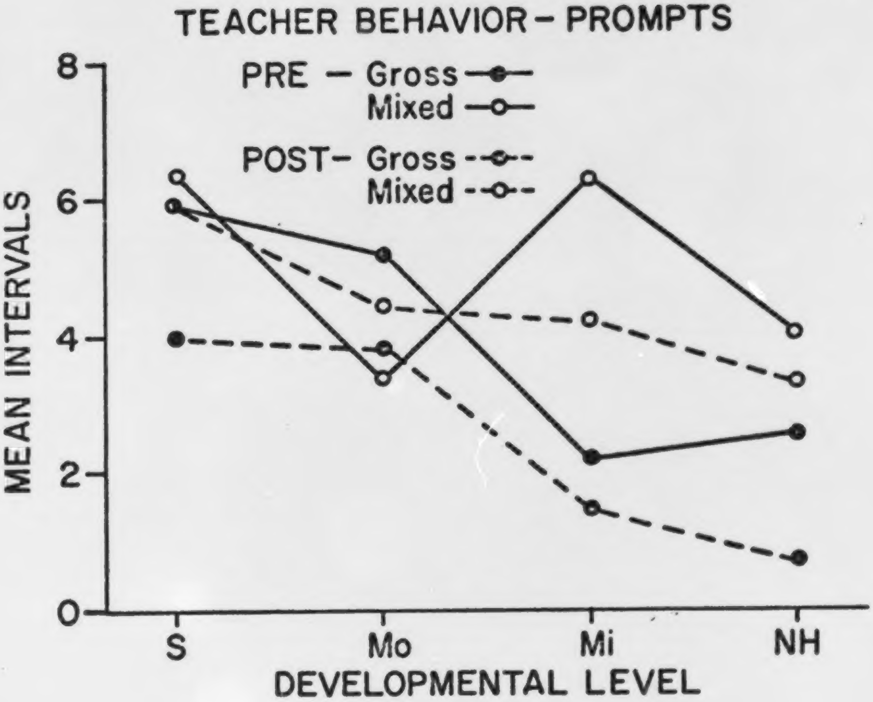

TEACHER BEHAVIOR - PROMPTS
PRE — Gross —●—
Mixed —○—
POST- Gross --○--
Mixed --○--
MEAN INTERVALS
8
6
4
2
0
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 66

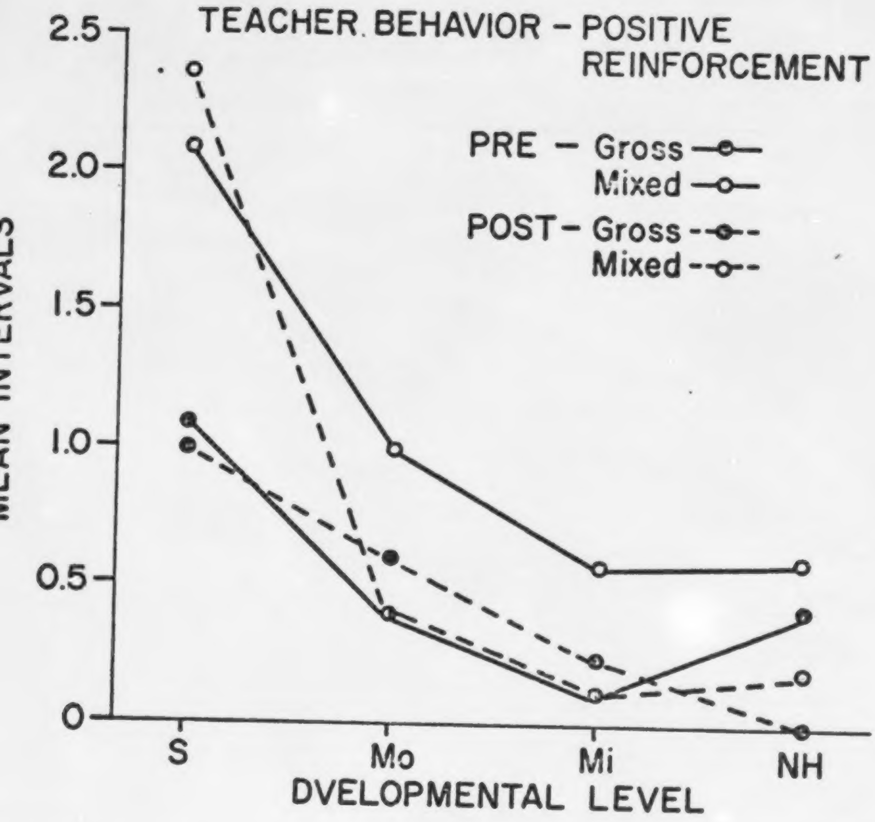
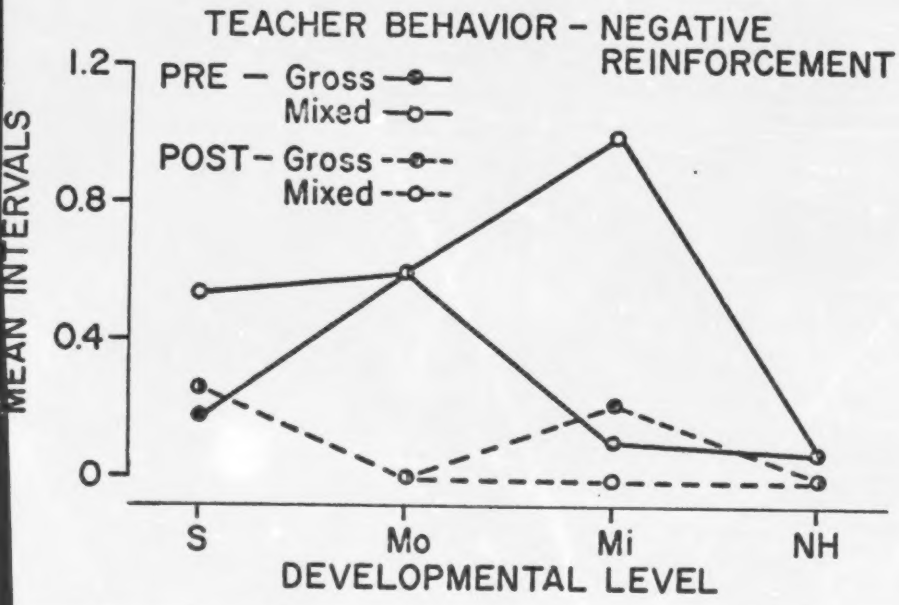

TEACHER BEHAVIOR - POSITIVE REINFORCEMENT
PRE - Gross
Mixed
POST - Gross
Mixed
MEAN INTERVALS
2.5
2.0
1.5
1.0
0.5
0
S
Mo
Mi
NH
DVELOPMENTAL LEVEL

Fig. 67


TEACHER BEHAVIOR - NEGATIVE REINFORCEMENT
PRE - Gross
Mixed
POST - Gross
Mixed
MEAN INTERVALS
1.2
0.8
0.4
0
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

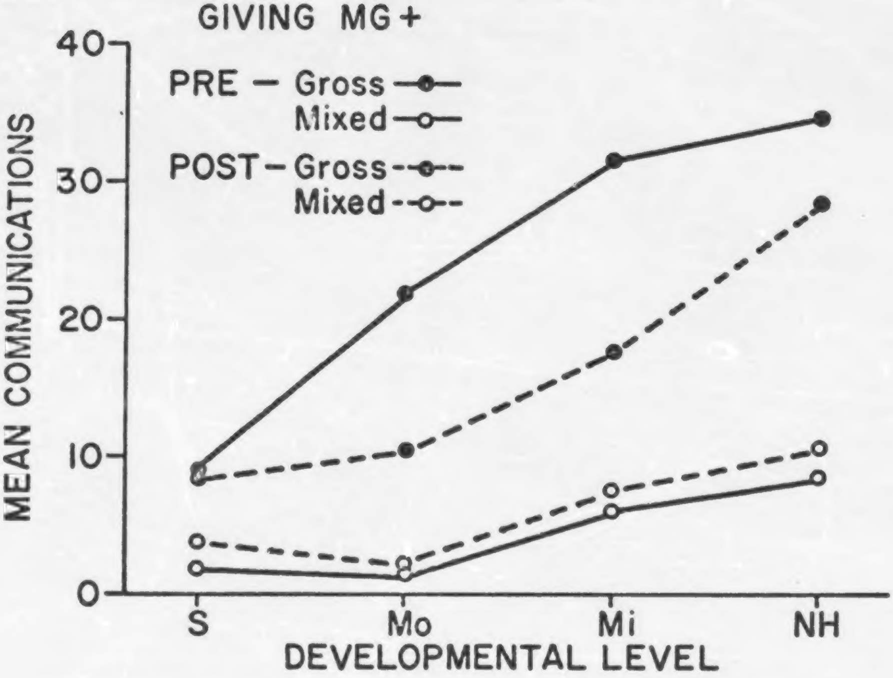
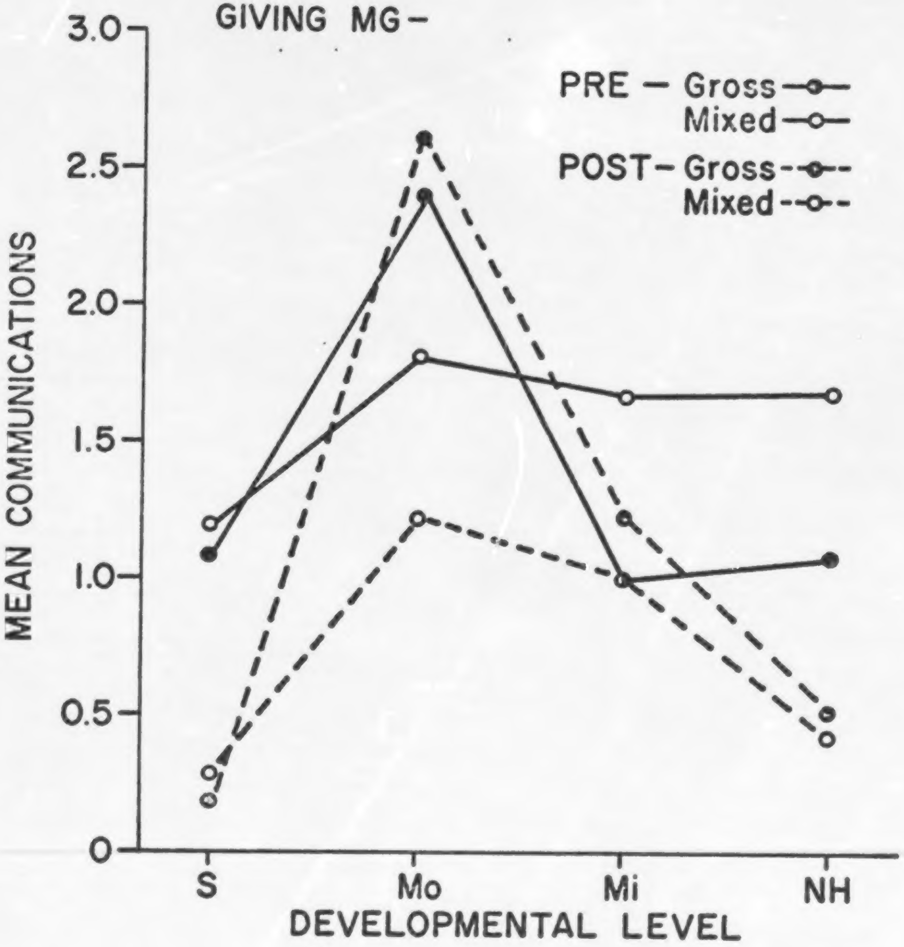
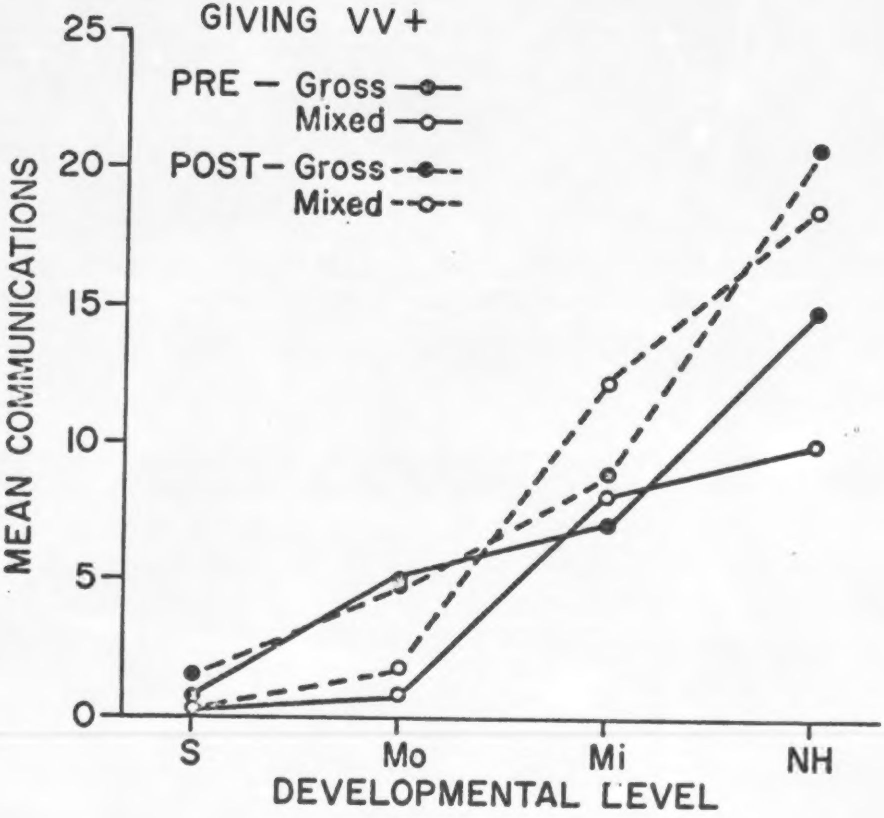

GIVING MG+
40
30
20
10
0
MEAN COMMUNICATIONS
PRE – Gross
Mixed
POST – Gross
Mixed
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 69



GIVING MG-
PRE — Gross —●—
Mixed —○—
POST — Gross - -●- -
Mixed - -○- -
3.0
2.5
2.0
1.5
1.0
0.5
0
MEAN COMMUNICATIONS
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 70


GIVING VV+
PRE – Gross
Mixed
POST – Gross
Mixed
MEAN COMMUNICATIONS
25
20
15
10
5
0
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

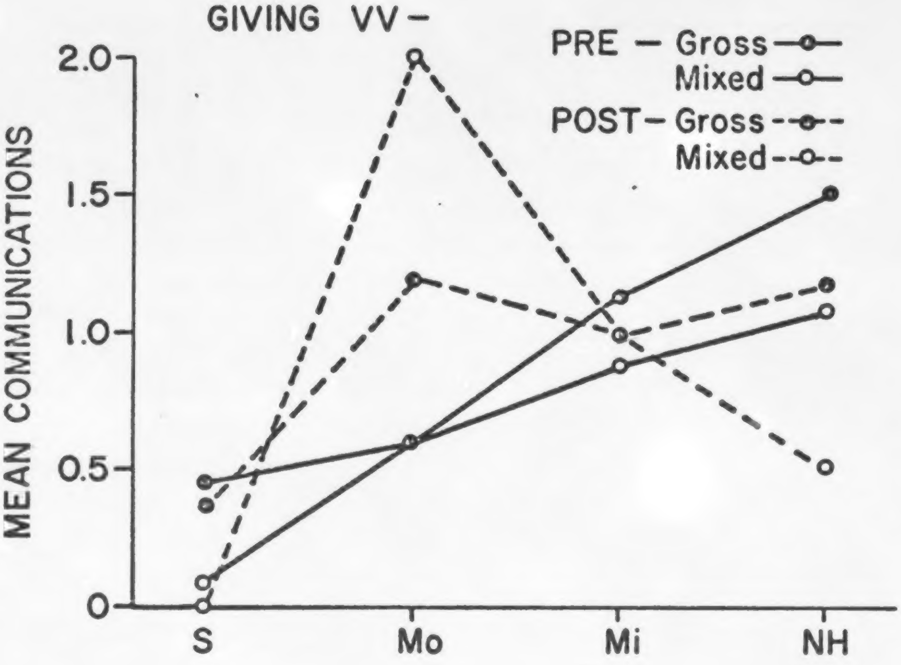

GIVING VV-
PRE - Gross
Mixed
POST- Gross
Mixed
MEAN COMMUNICATIONS
2.0
1.5
1.0
0.5
0
S
Mo
Mi
NH

Fig. 72

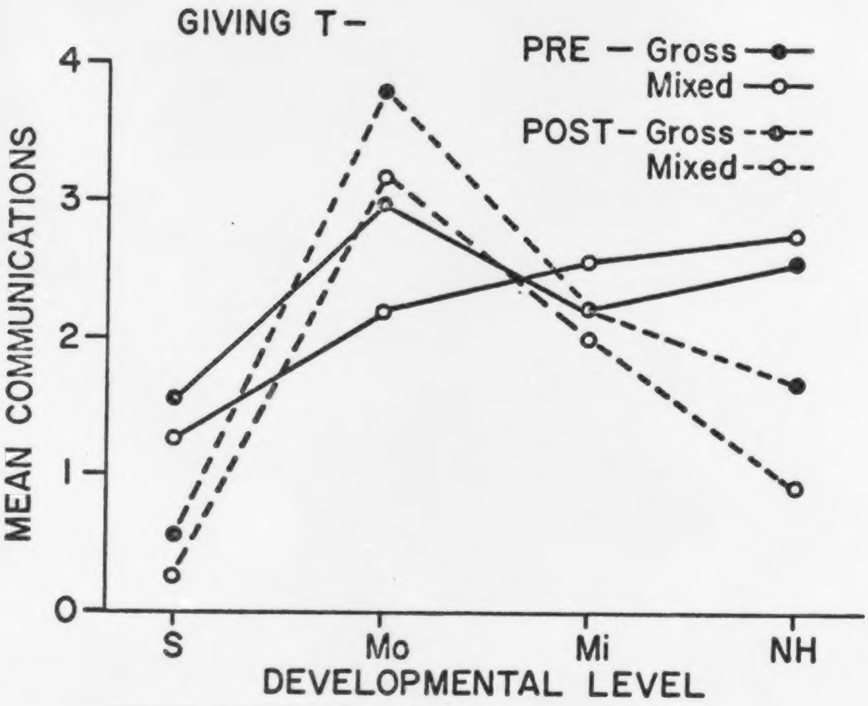

GIVING T-
PRE – Gross –●–
Mixed –○–
POST – Gross --●--
Mixed --○--
MEAN COMMUNICATIONS
0
1
2
3
4
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 73

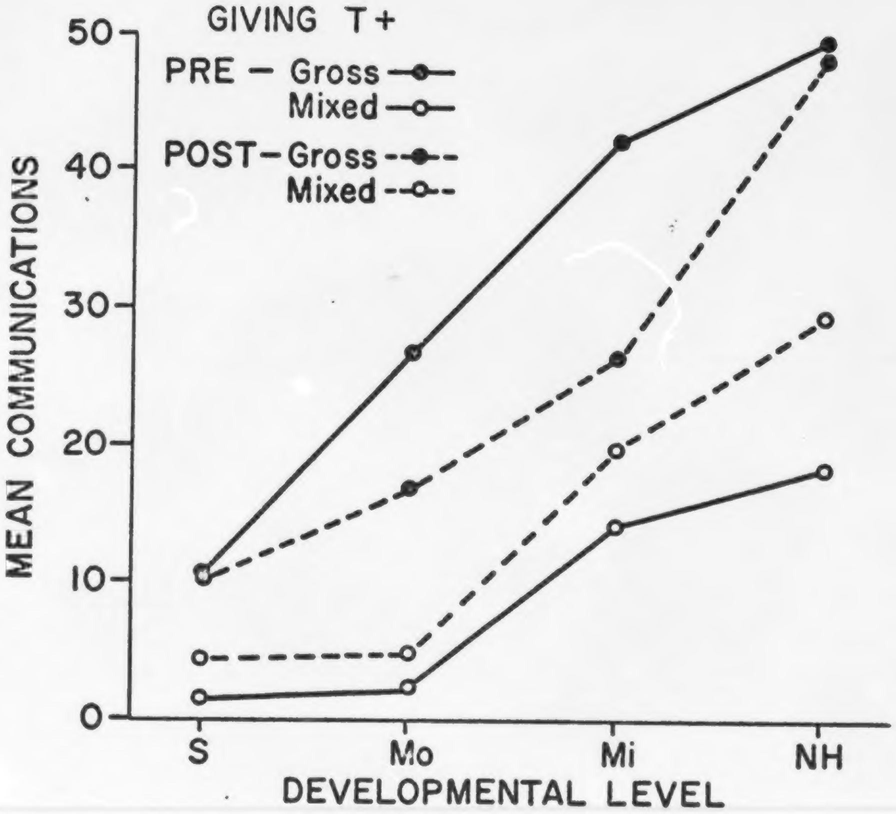

GIVING T+
PRE – Gross
Mixed
POST – Gross
Mixed
MEAN COMMUNICATIONS
50
40
30
20
10
0
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 74

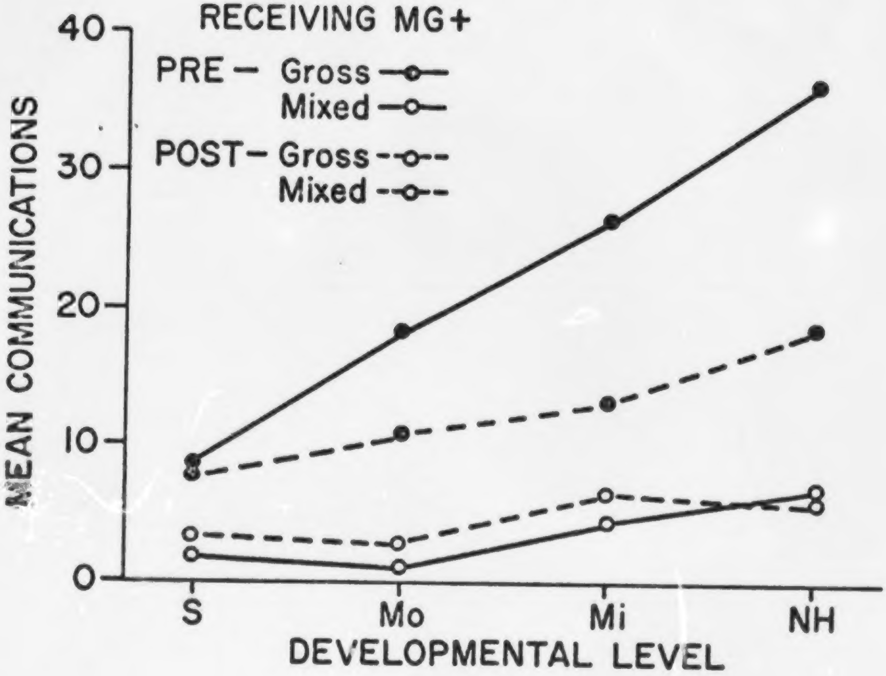

RECEIVING MG+
PRE — Gross —●—
Mixed —○—
POST — Gross --●--
Mixed --○--
MEAN COMMUNICATIONS
0
10
20
30
40
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 75

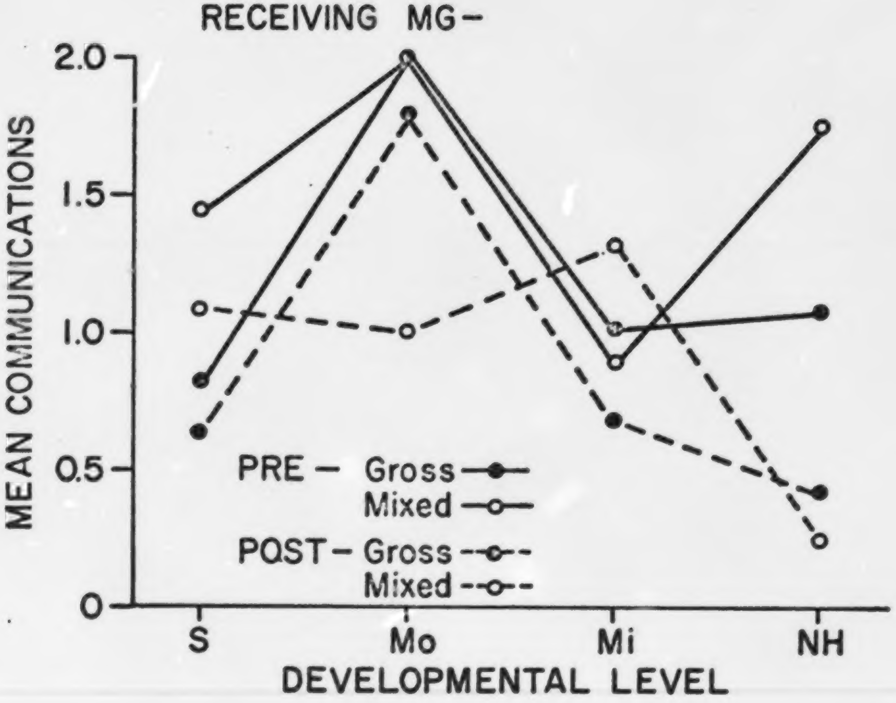

RECEIVING MG-
MEAN COMMUNICATIONS
2.0
1.5
1.0
0.5
0
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL
PRE - Gross
Mixed
POST - Gross
Mixed

Fig. 76

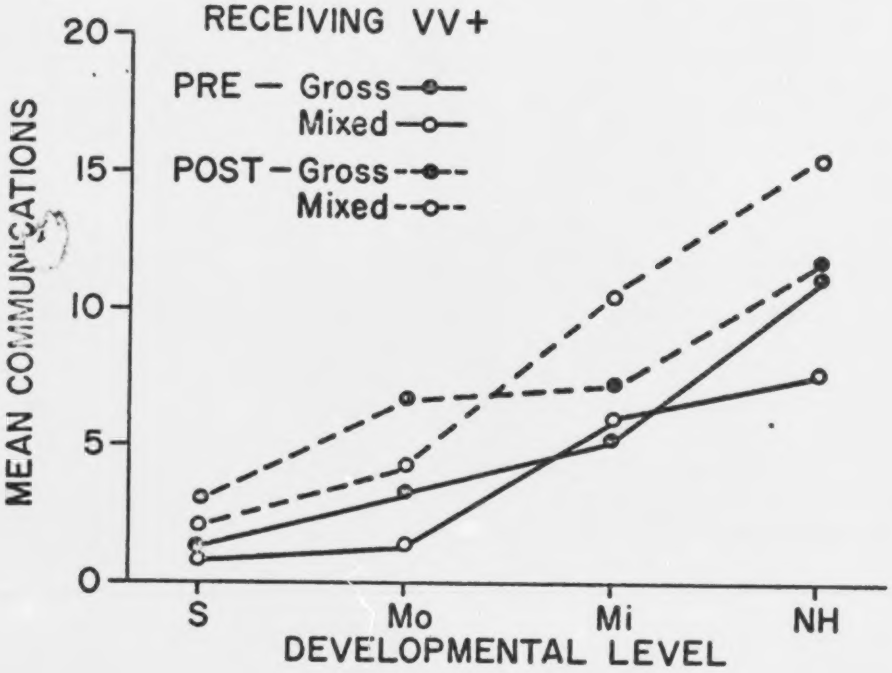
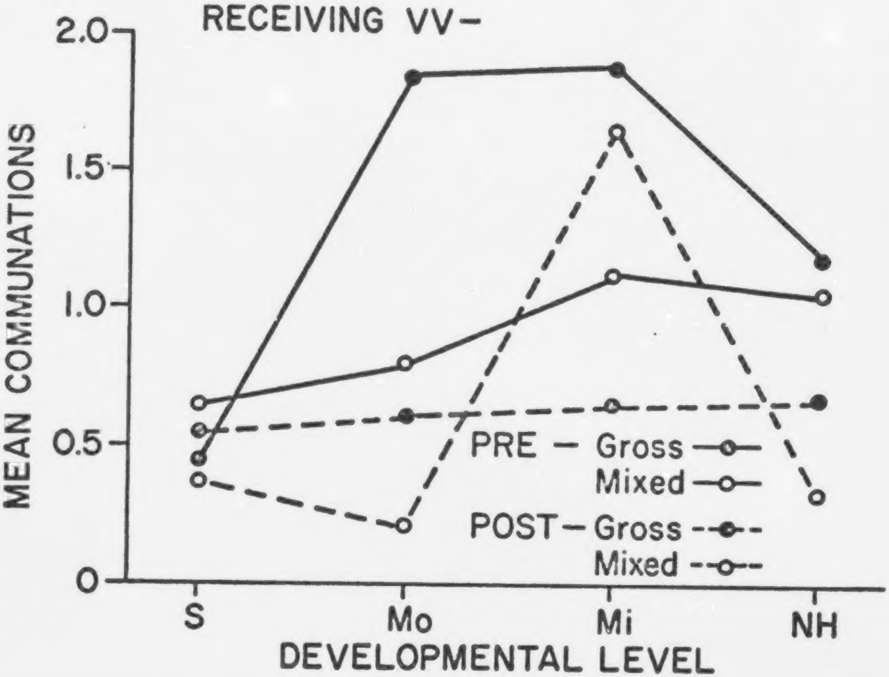

RECEIVING VV+
PRE — Gross —●—
Mixed —○—
POST — Gross --●--
Mixed --○--
MEAN COMMUNICATIONS
20
15
10
5
0
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 77


RECEIVING VV-
MEAN COMMUNATIONS
2.0
1.5
1.0
0.5
0
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL
PRE – Gross —●—
Mixed —○—
POST – Gross --●--
Mixed --○--

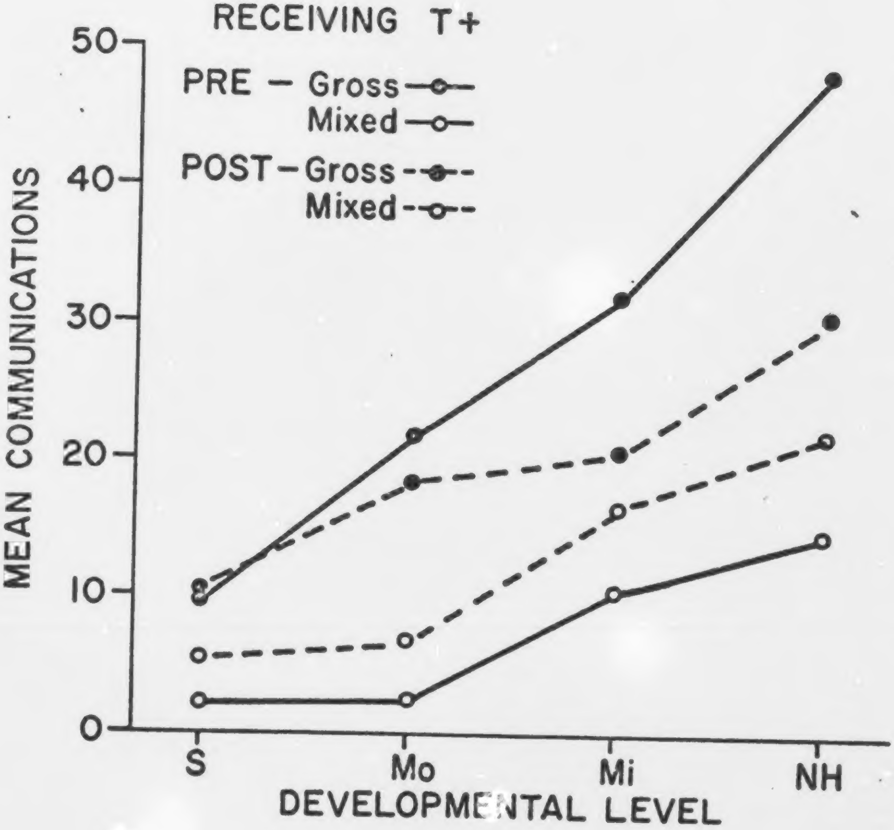

RECEIVING T+
PRE – Gross —●—
Mixed —○—
POST – Gross --●--
Mixed --○--
MEAN COMMUNICATIONS
0
10
20
30
40
50
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 79

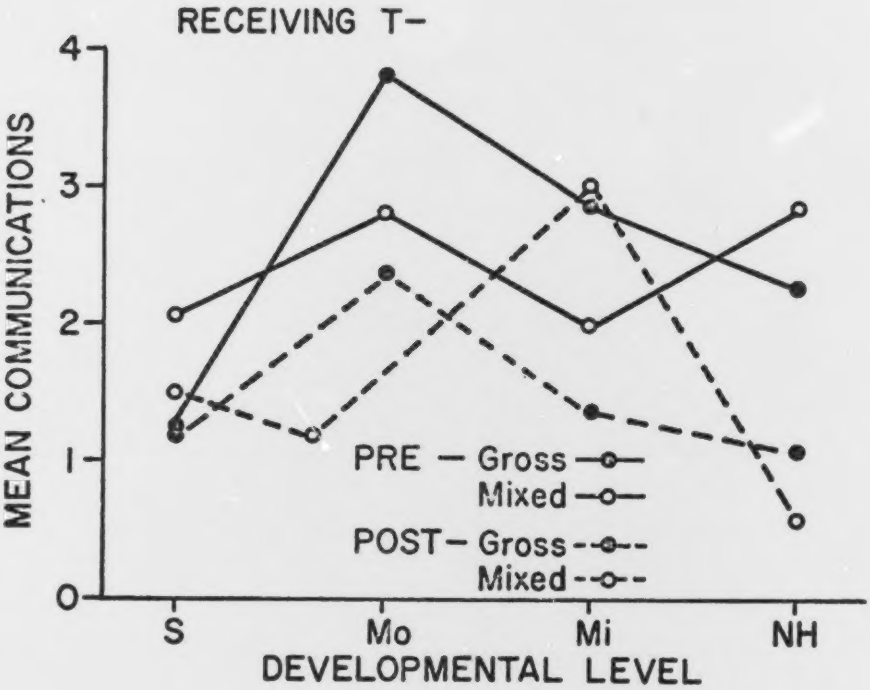
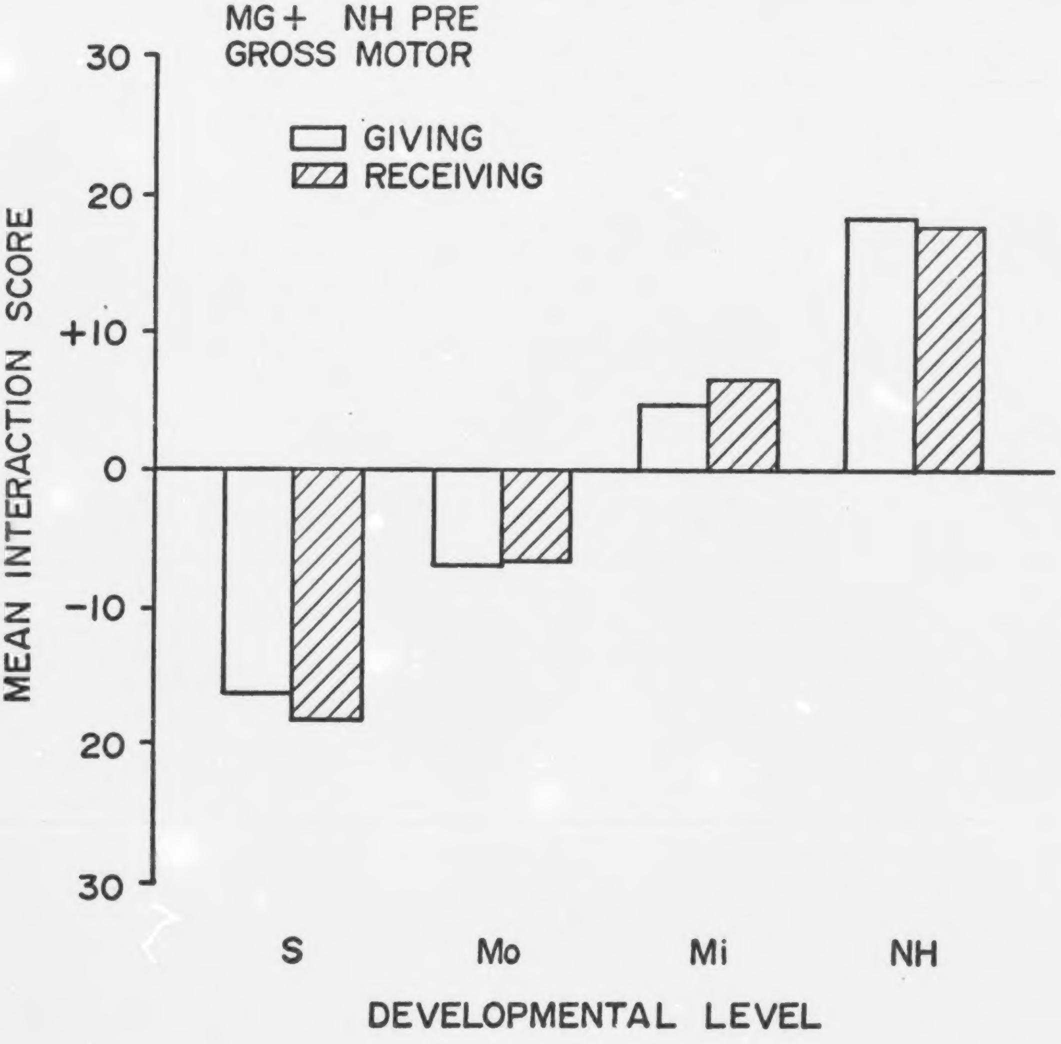

RECEIVING T-
MEAN COMMUNICATIONS
4
3
2
1
0
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL
PRE — Gross —●—
Mixed —○—
POST — Gross --●--
Mixed --○--

Fig. 80


MG + NH PRE
GROSS MOTOR
GIVING
RECEIVING
MEAN INTERACTION SCORE
30
20
+10
0
-10
20
30
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

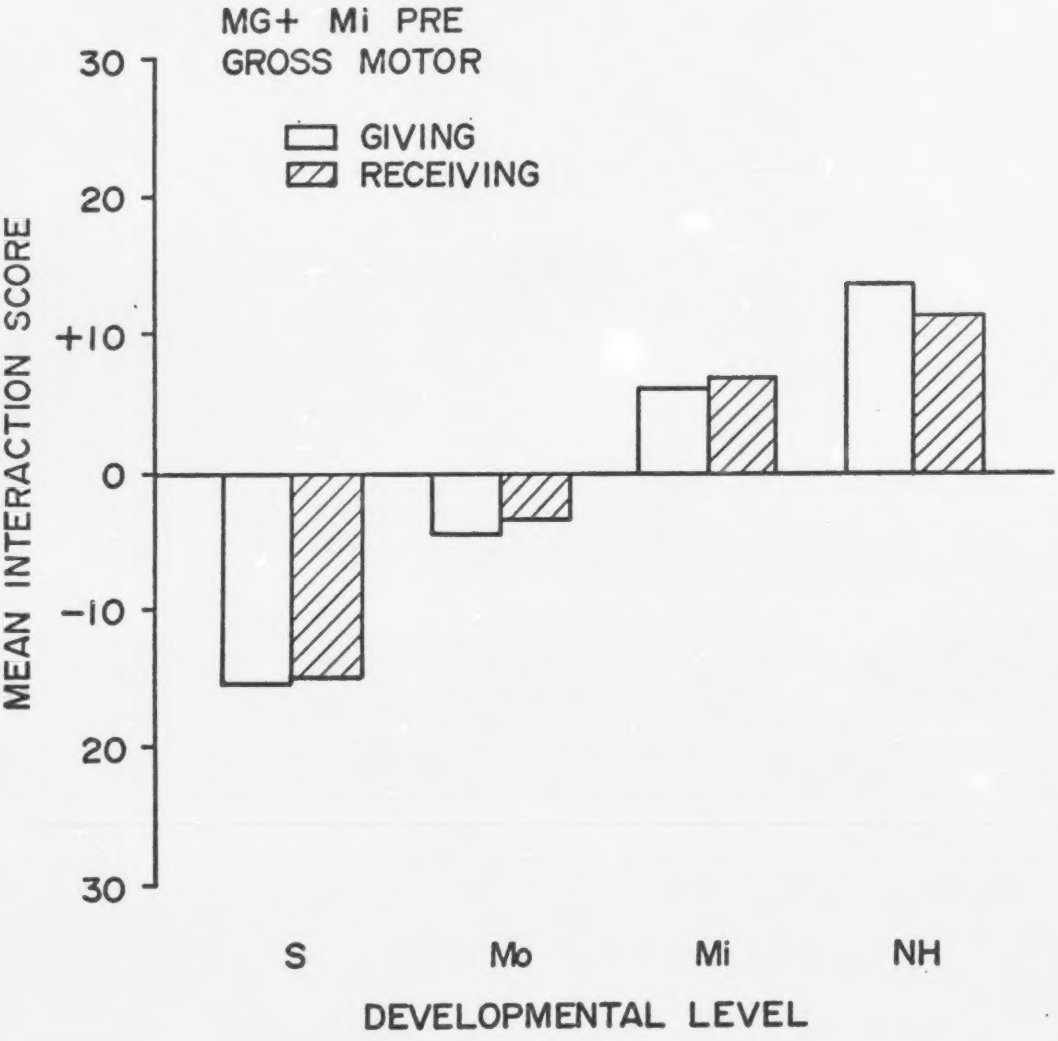

MG+ Mi PRE
GROSS MOTOR
GIVING
RECEIVING
MEAN INTERACTION SCORE
30
20
+10
0
-10
20
30
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig.

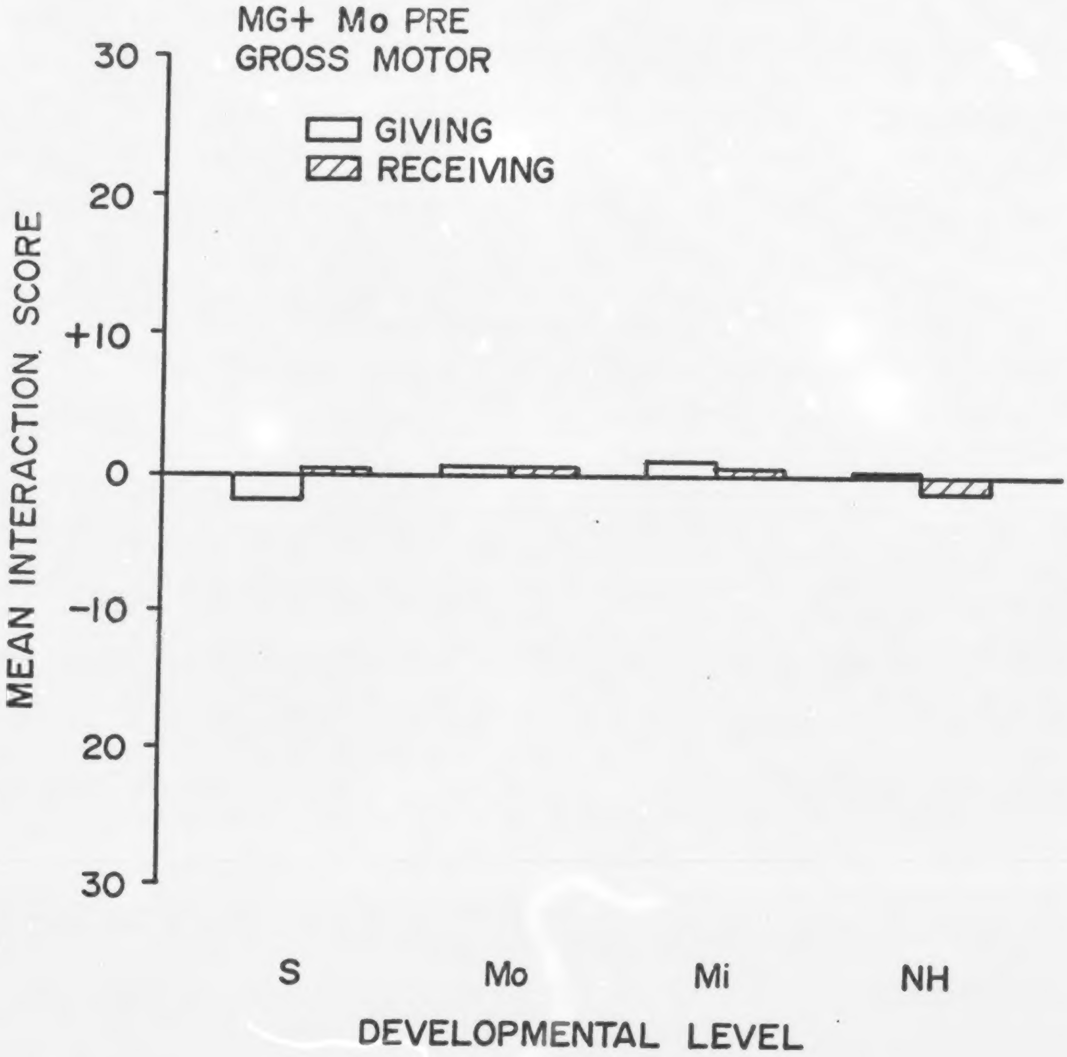

MG+ Mo PRE
GROSS MOTOR
GIVING
RECEIVING
MEAN INTERACTION SCORE
30
20
+10
0
-10
20
30
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 83

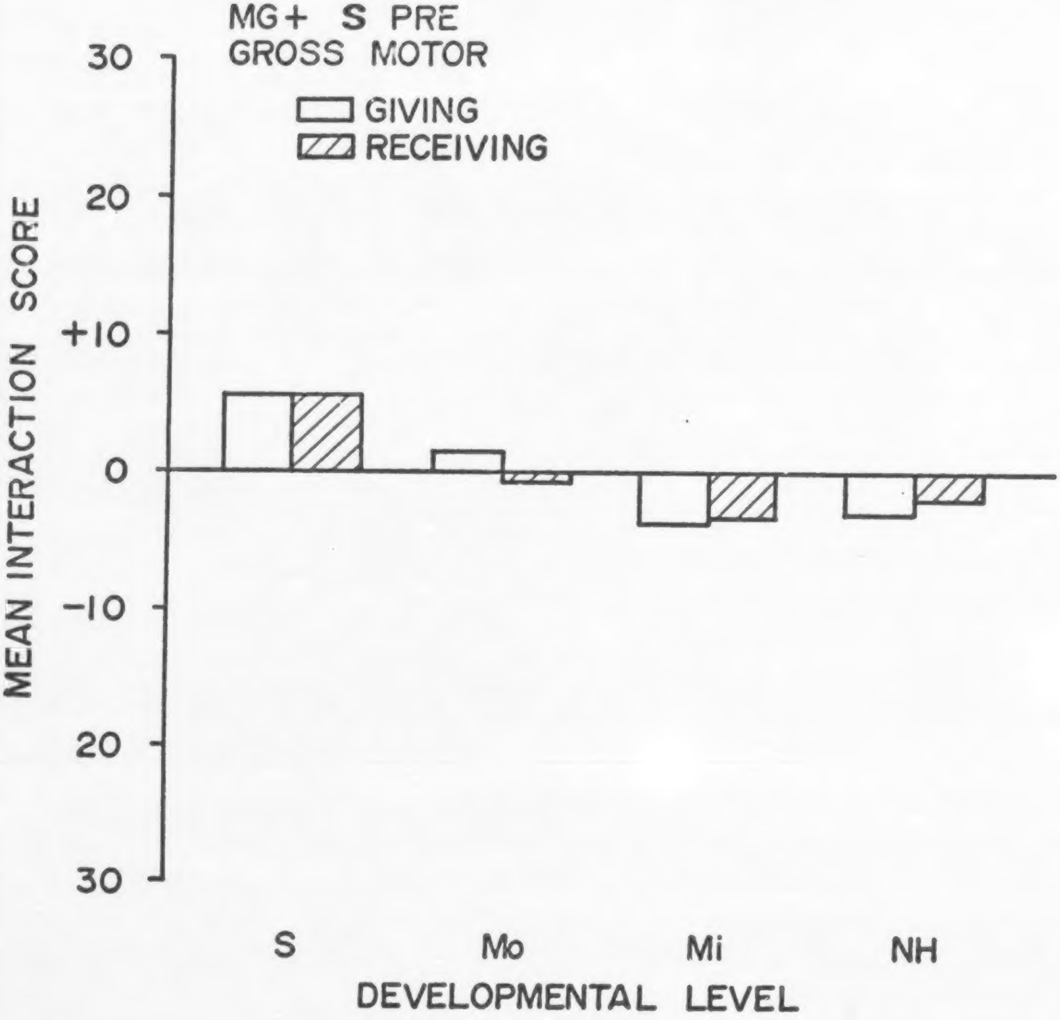

MG+ S PRE
GROSS MOTOR
☐ GIVING
▨ RECEIVING
30
20
+10
0
-10
20
30
MEAN INTERACTION SCORE
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 84

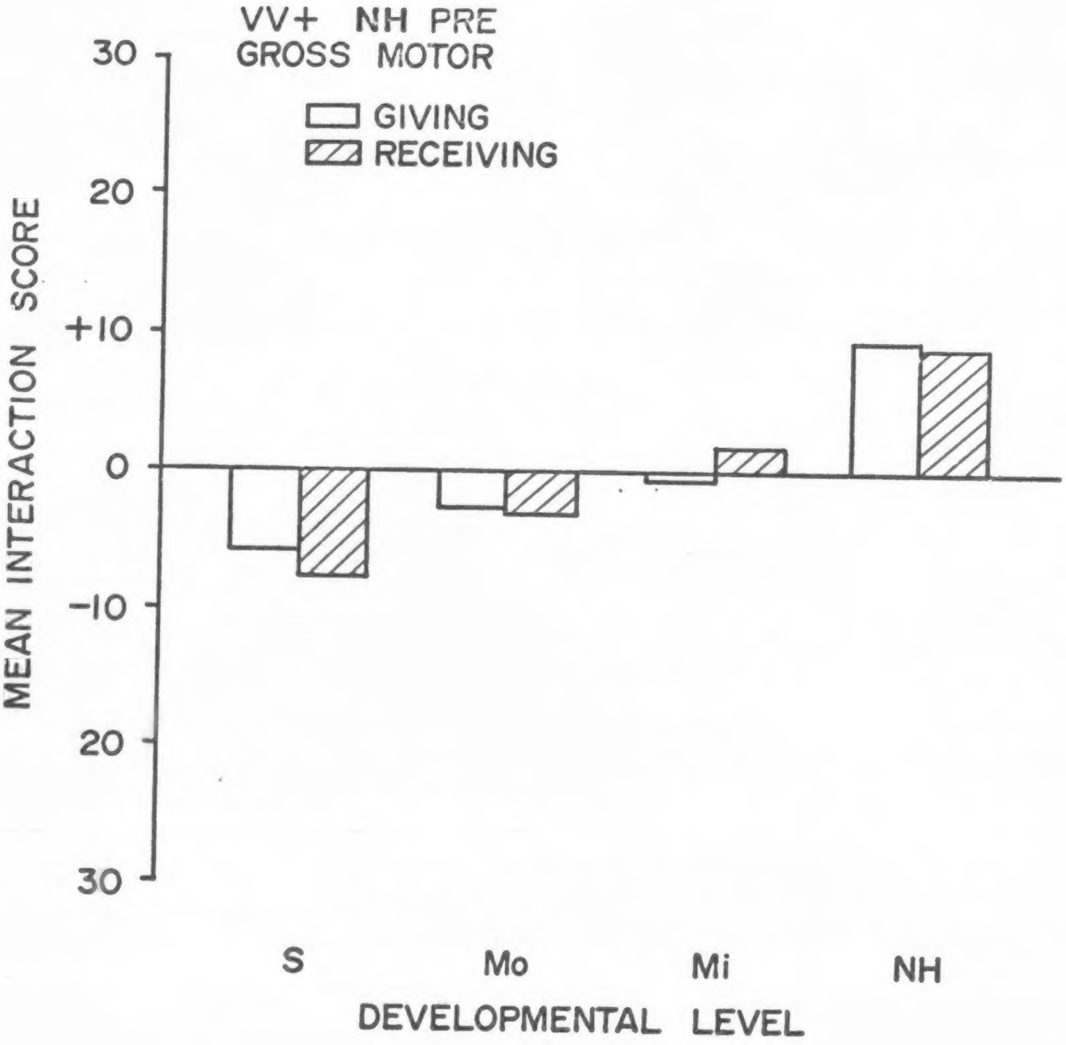
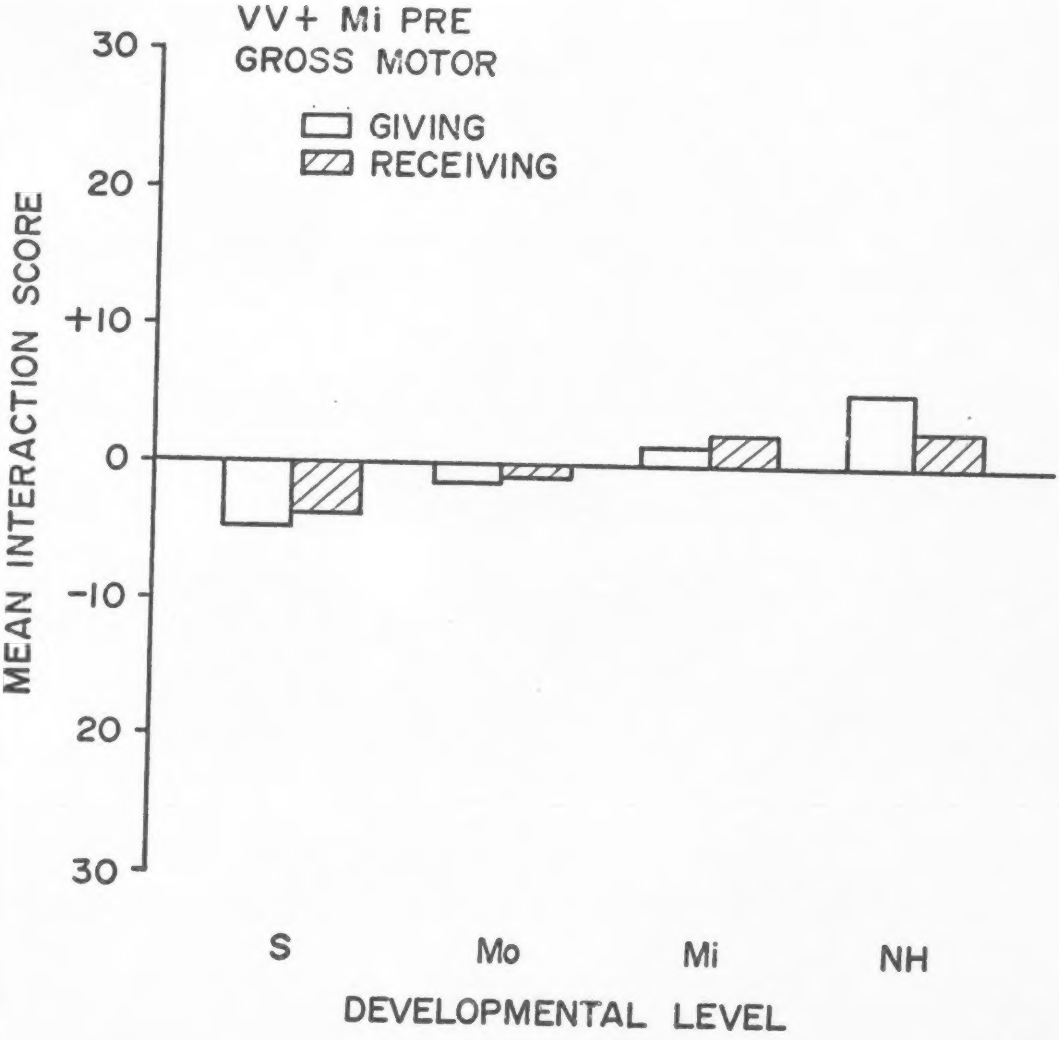

VV+ NH PRE
GROSS MOTOR
GIVING
RECEIVING
30
20
+10
0
-10
20
30
MEAN INTERACTION SCORE
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 85


VV+ Mi PRE
GROSS MOTOR
☐ GIVING
▨ RECEIVING
30
20
+10
0
-10
20
30
MEAN INTERACTION SCORE
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

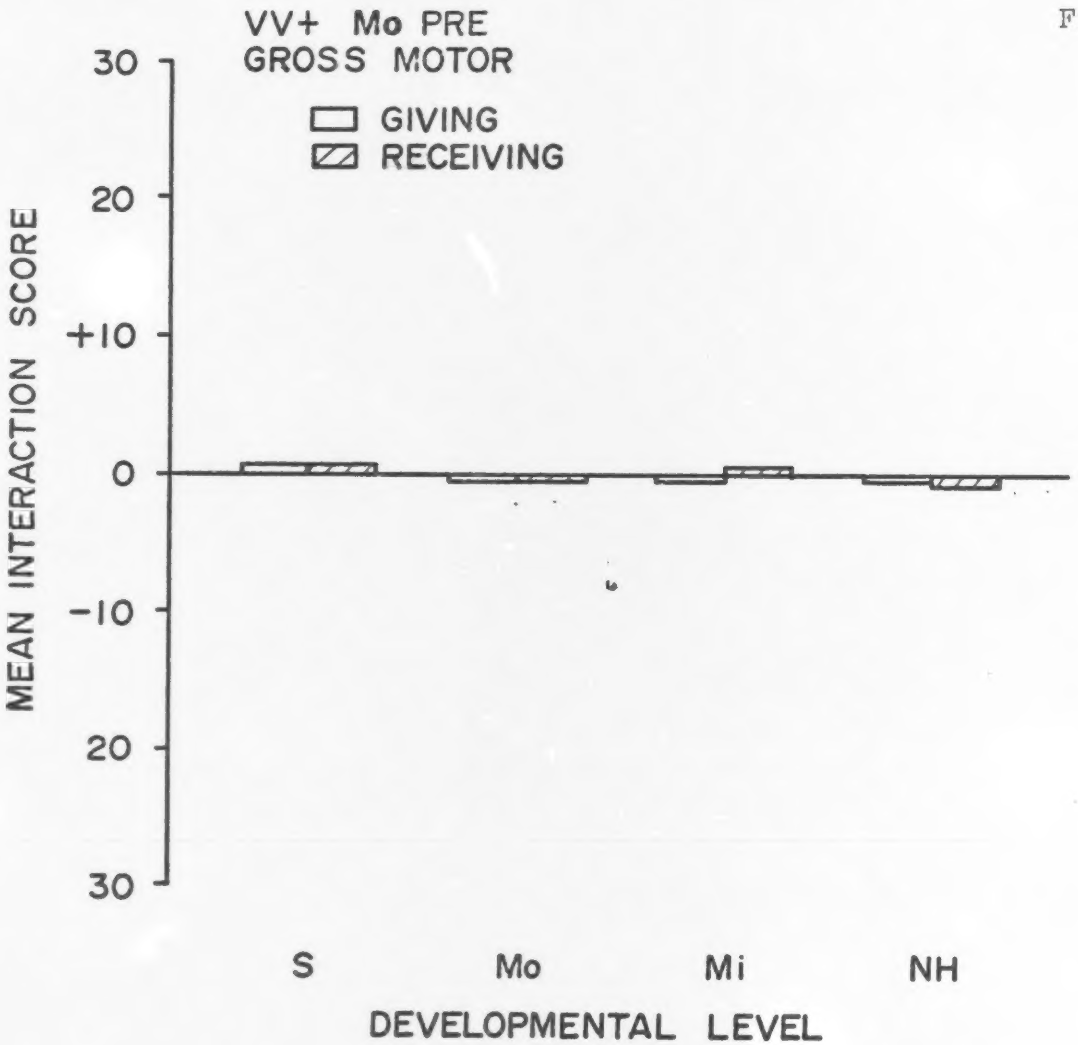

VV+ Mo PRE
GROSS MOTOR
GIVING
RECEIVING
MEAN INTERACTION SCORE
30
20
+10
0
-10
20
30
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 87

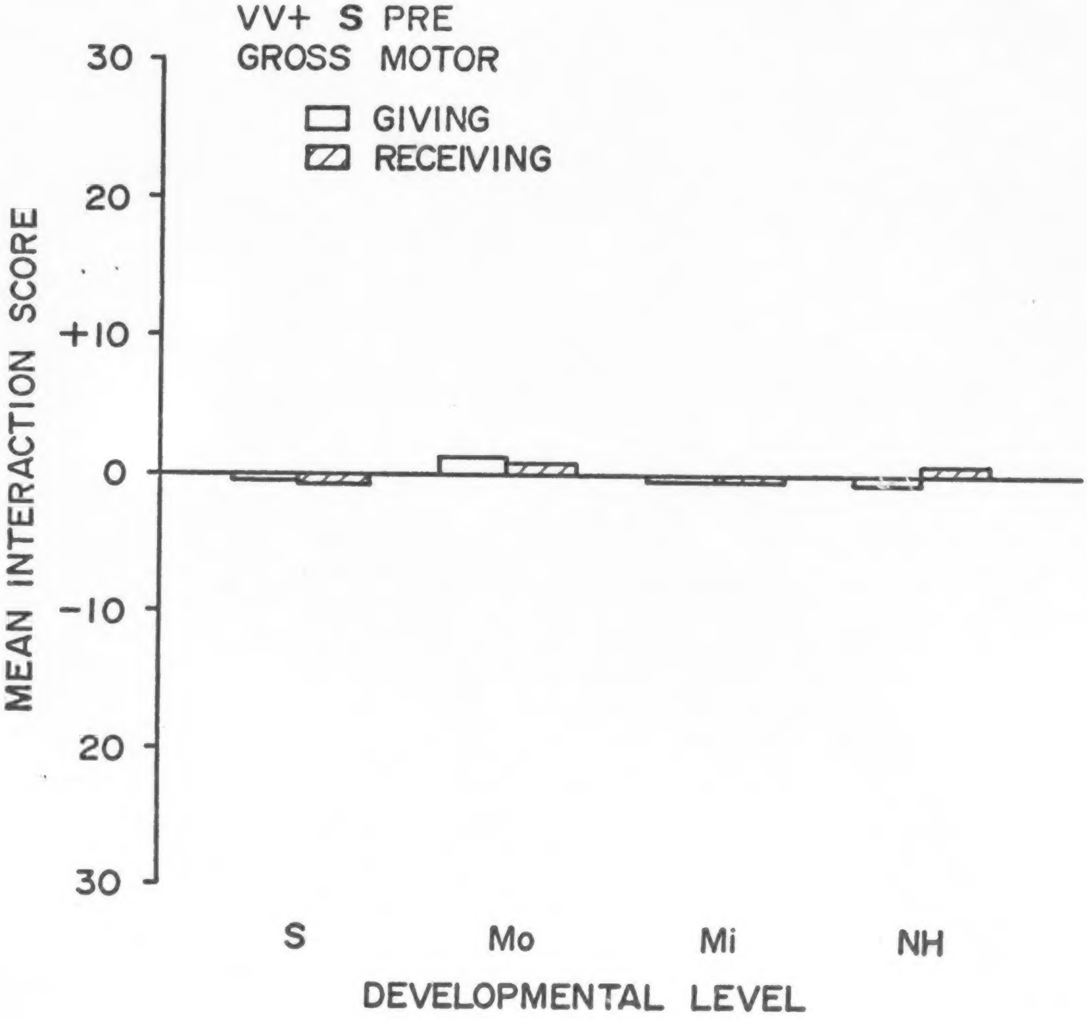

VV+ S PRE
GROSS MOTOR
☐ GIVING
▨ RECEIVING
30
20
+10
0
-10
20
30
MEAN INTERACTION SCORE
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 88

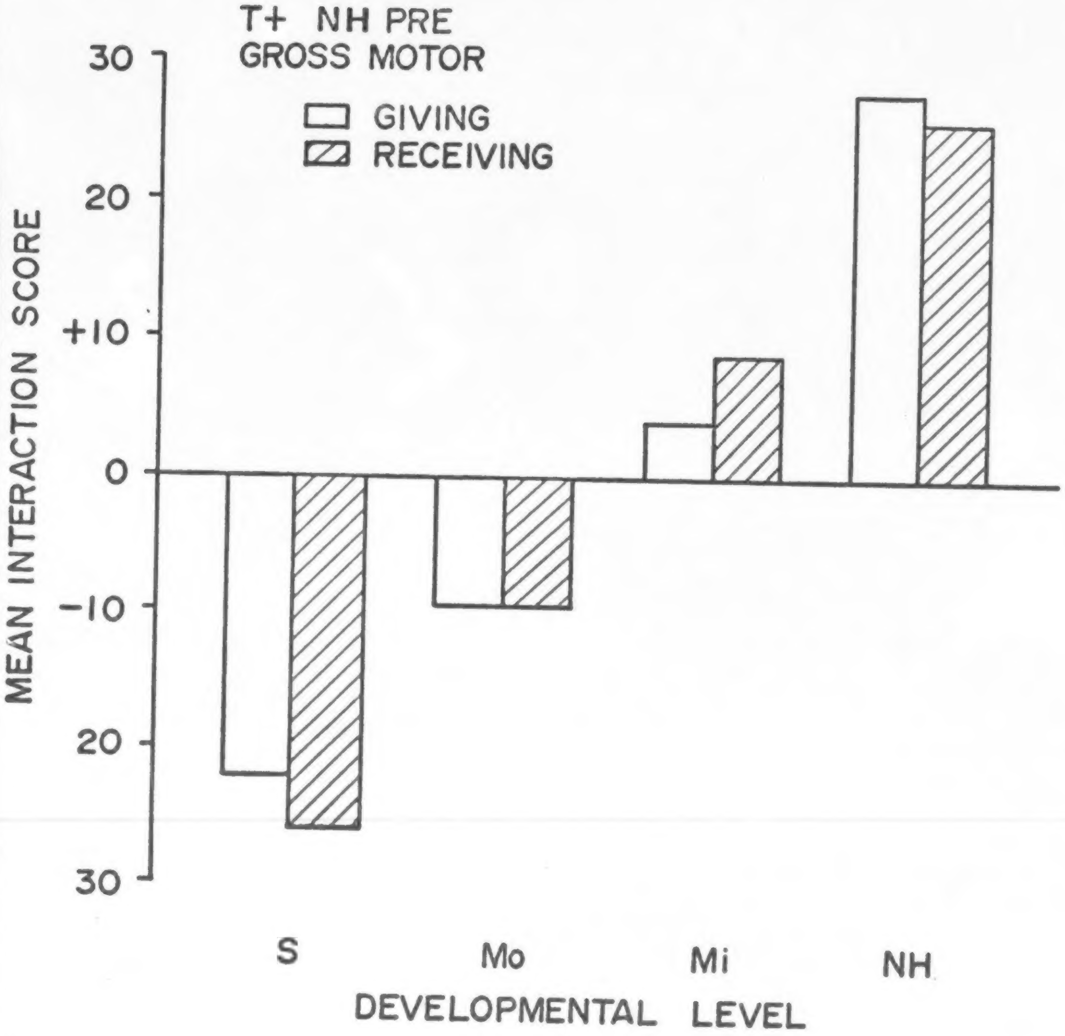

T+ NH PRE
GROSS MOTOR
GIVING
RECEIVING
MEAN INTERACTION SCORE
30
20
+10
0
-10
20
30
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 89

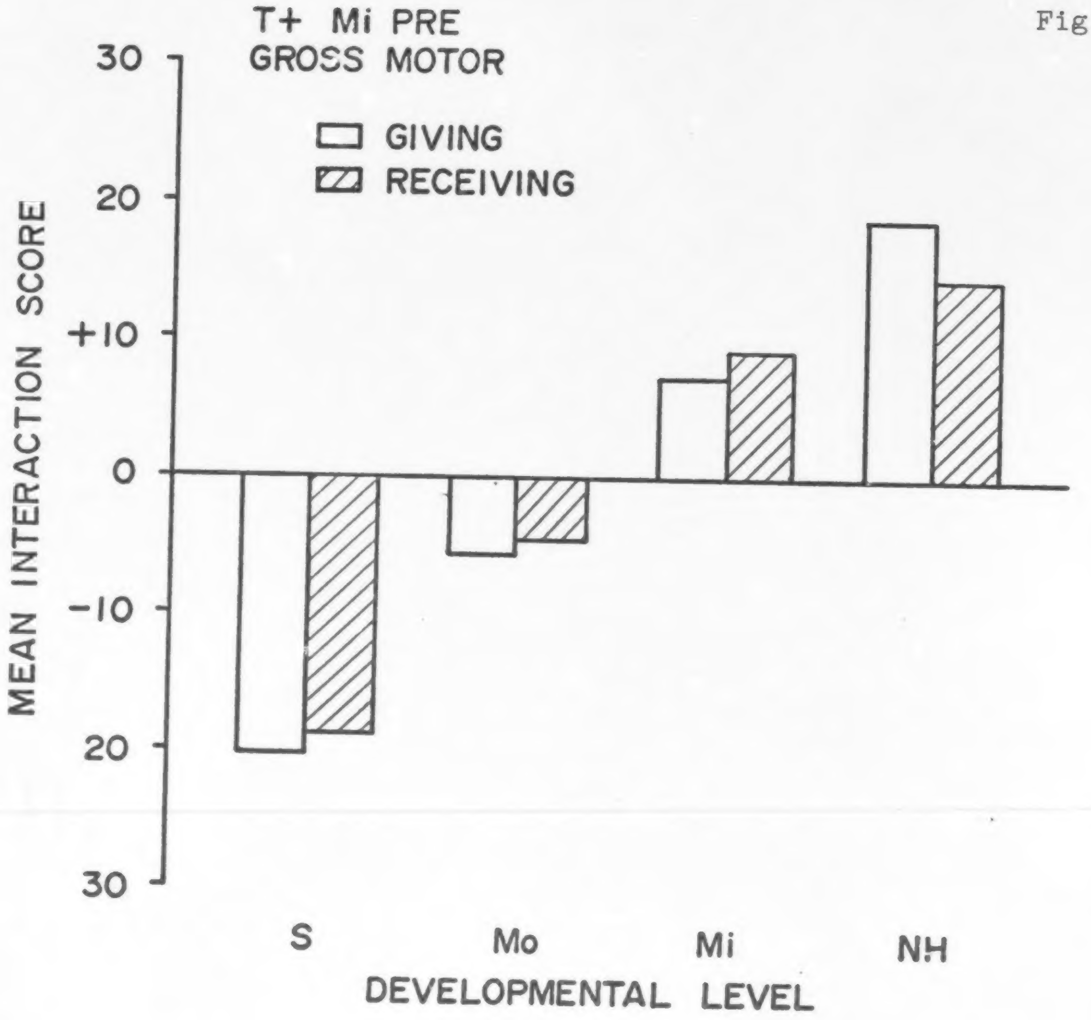

T+ Mi PRE
GROSS MOTOR
☐ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
30
20
+10
0
-10
20
30
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 90

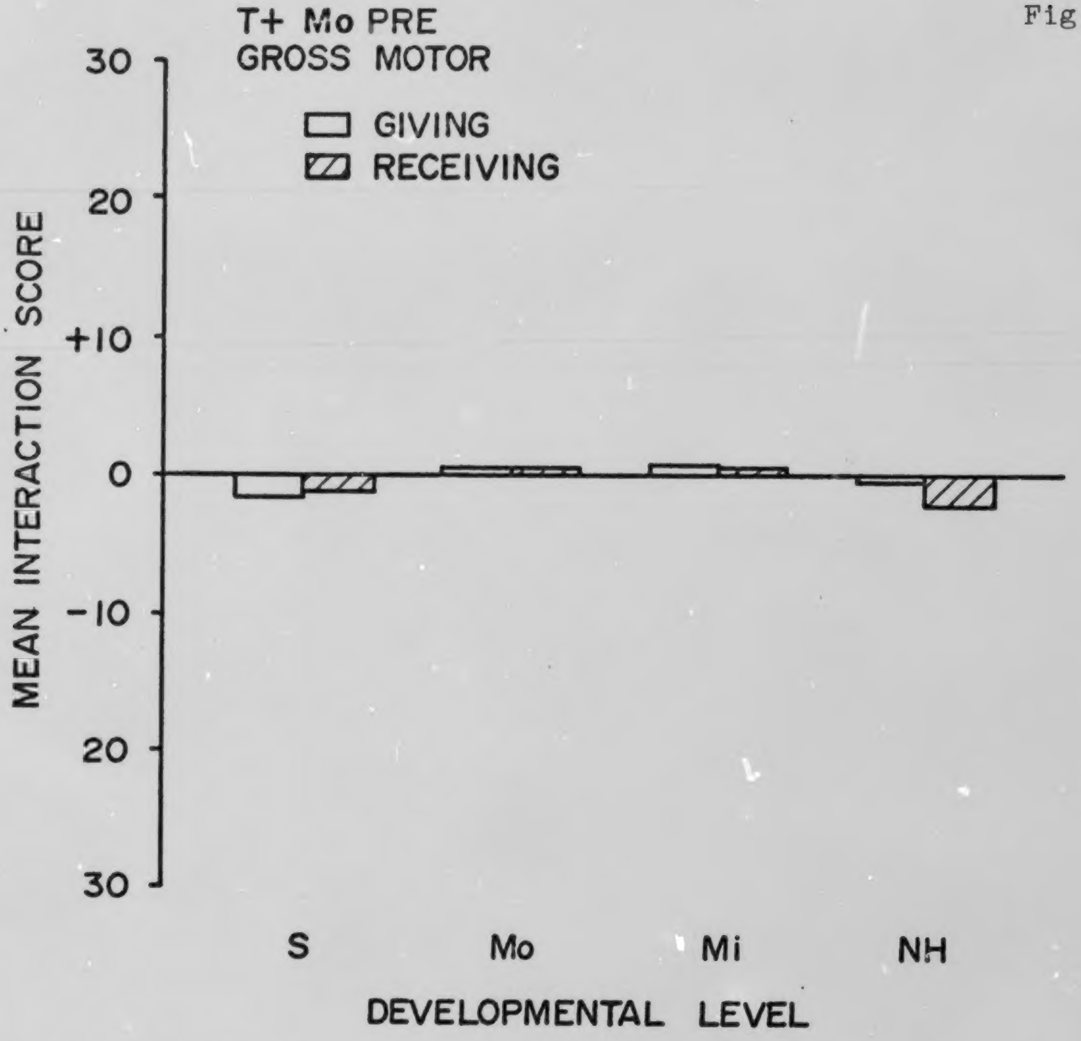

T+ Mo PRE
GROSS MOTOR
GIVING
RECEIVING
MEAN INTERACTION SCORE
30
20
+10
0
-10
20
30
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 91

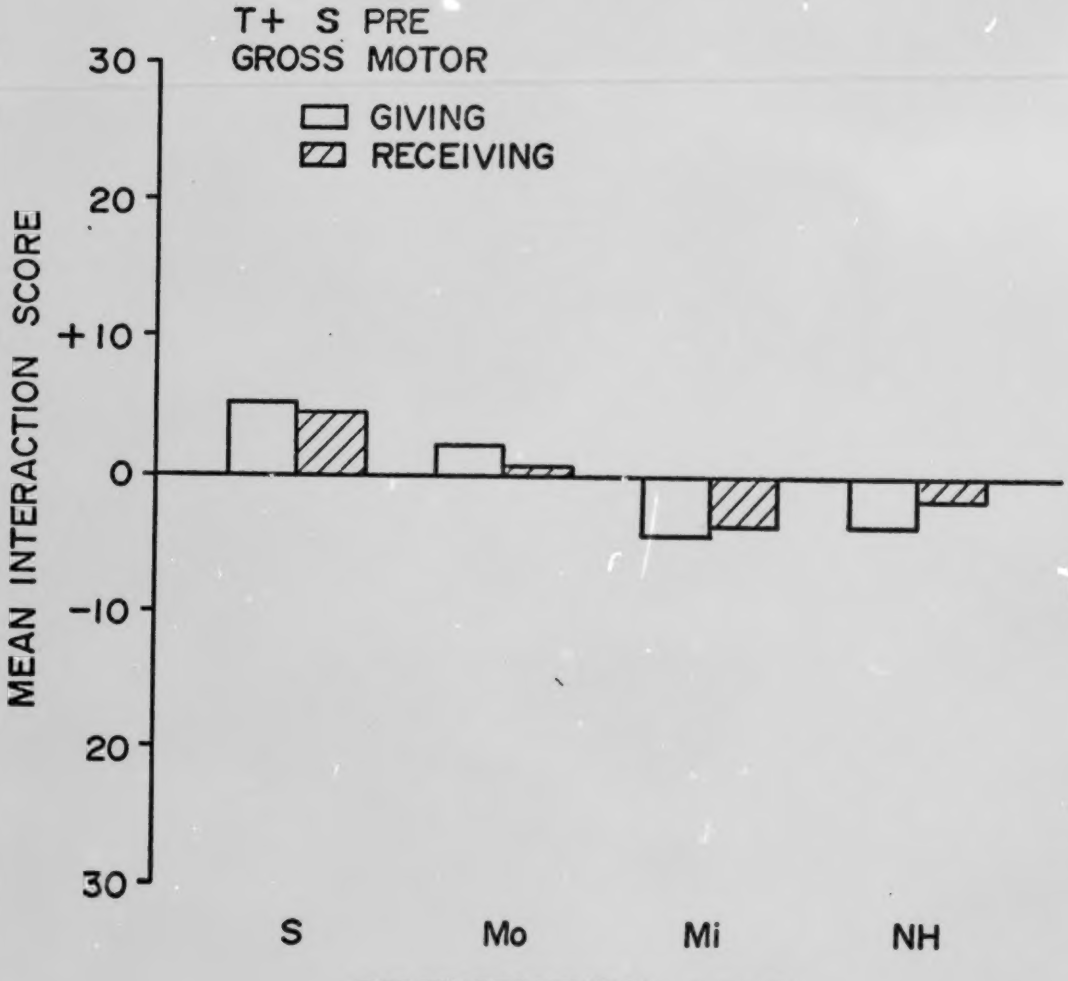
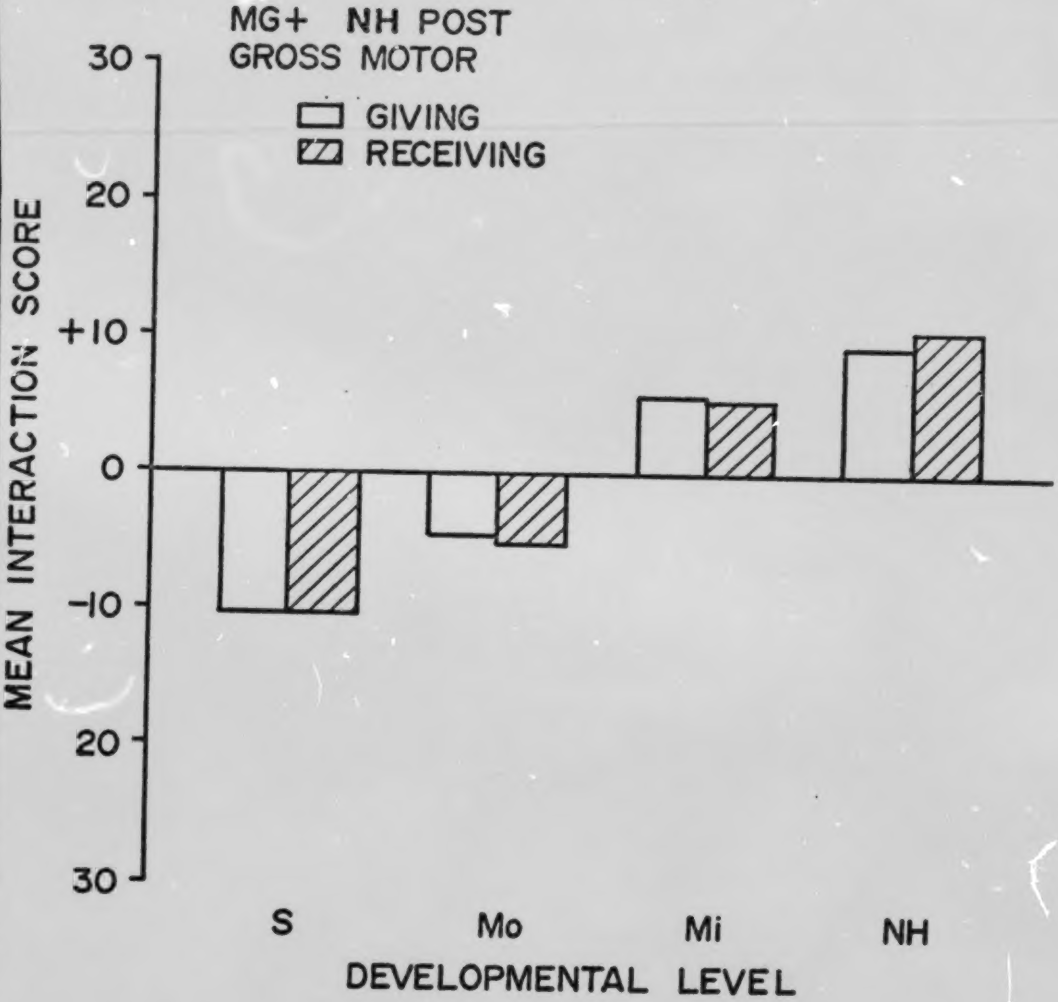

T+ S PRE
GROSS MOTOR
▭ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
30
20
+10
0
-10
20
30
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 92


MG+ NH POST
GROSS MOTOR
☐ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
30
20
+10
0
-10
20
30
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

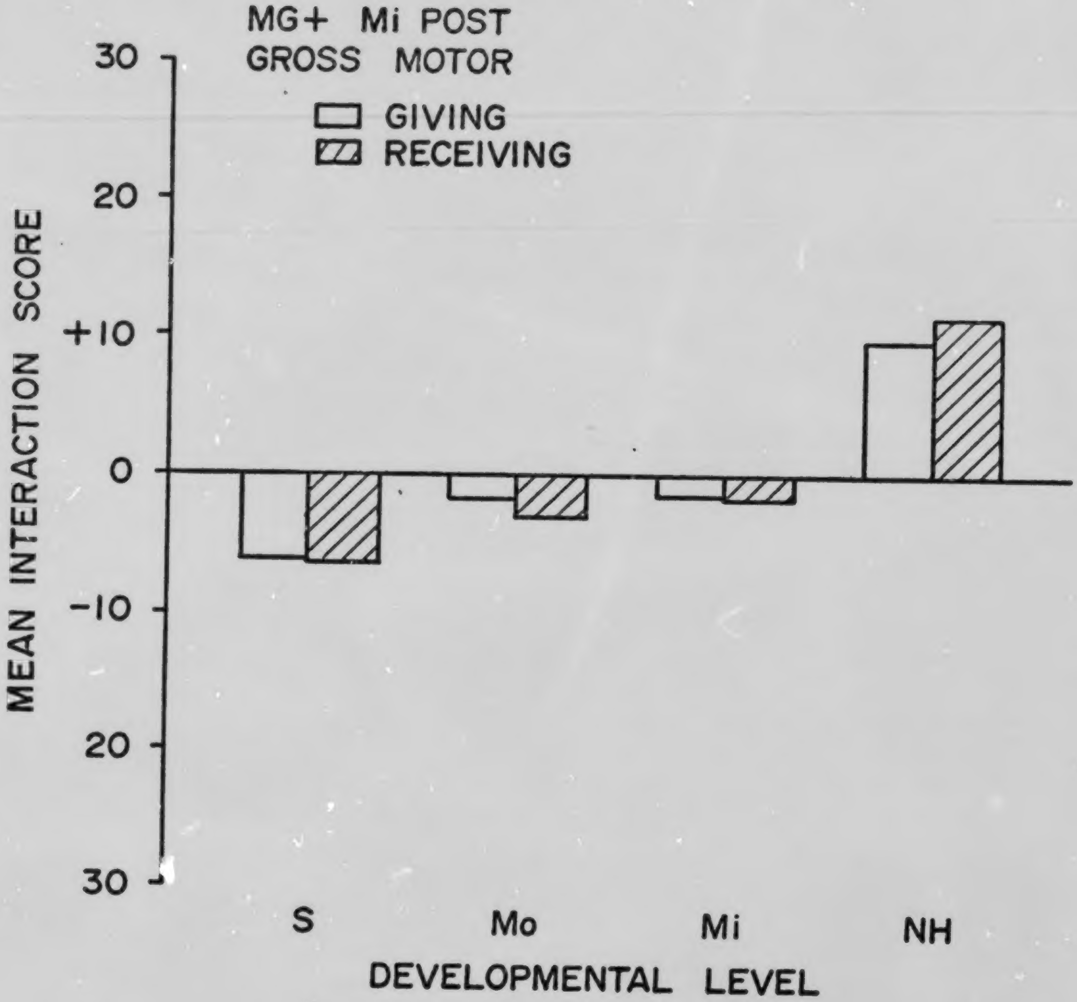
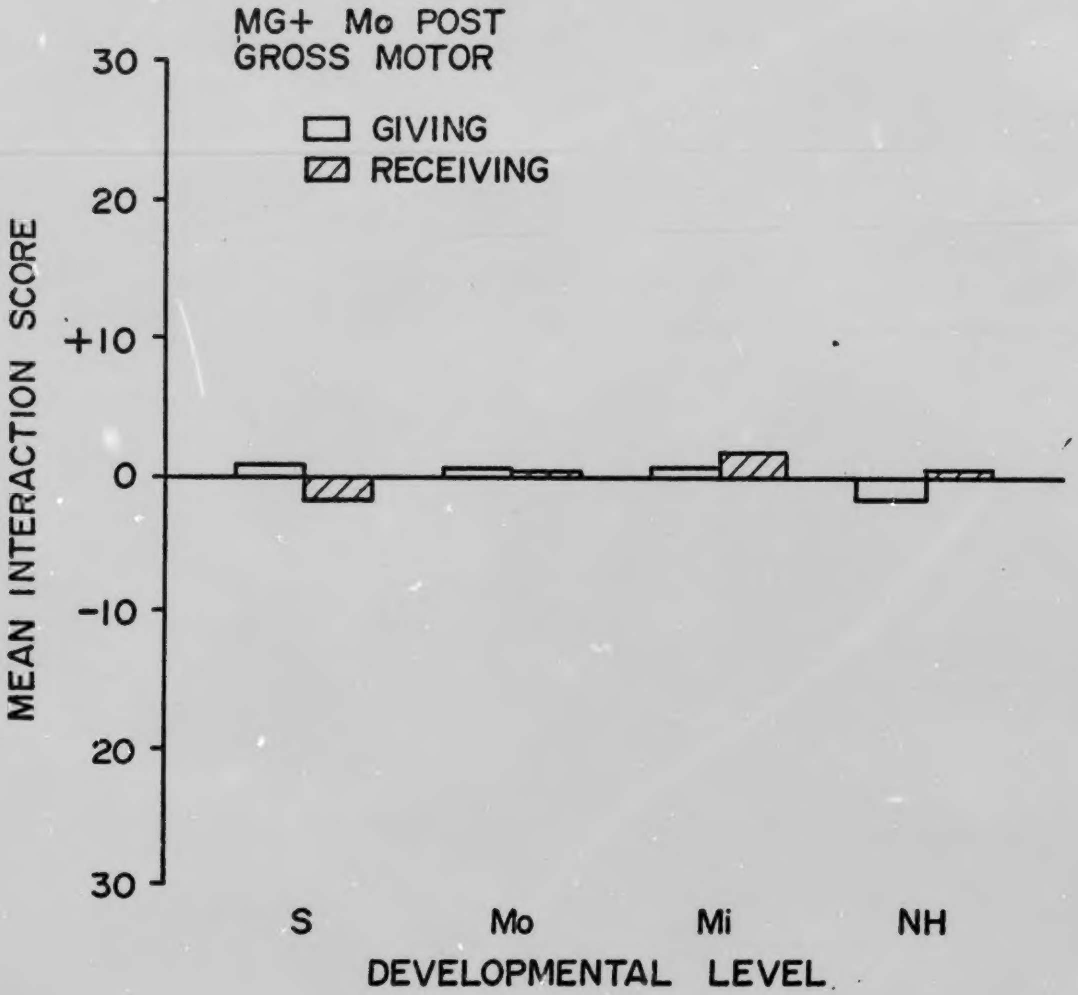

MG+ Mi POST
GROSS MOTOR
GIVING
RECEIVING
MEAN INTERACTION SCORE
30
20
+10
0
-10
20
30
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 94


MG+ Mo POST
GROSS MOTOR
☐ GIVING
▨ RECEIVING
30
20
+10
0
-10
20
30
MEAN INTERACTION SCORE
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

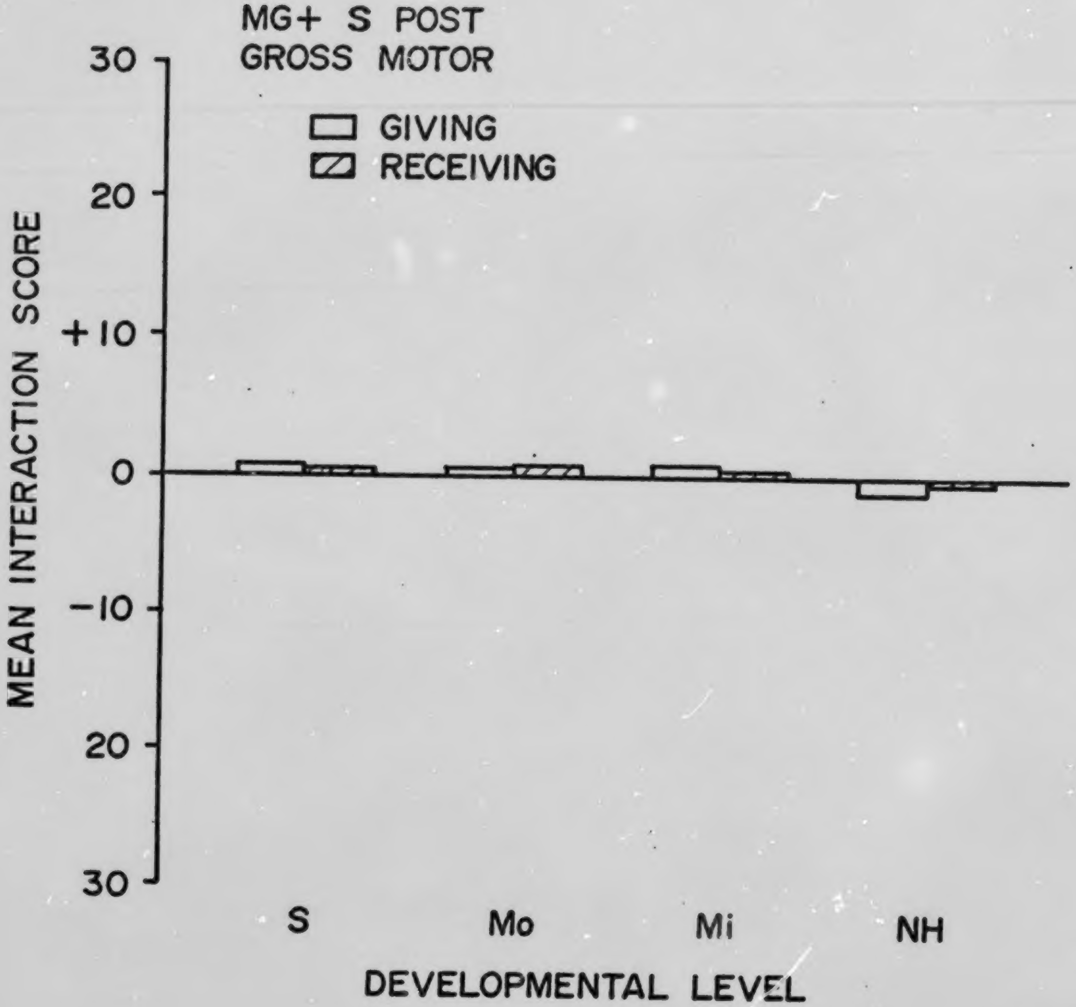
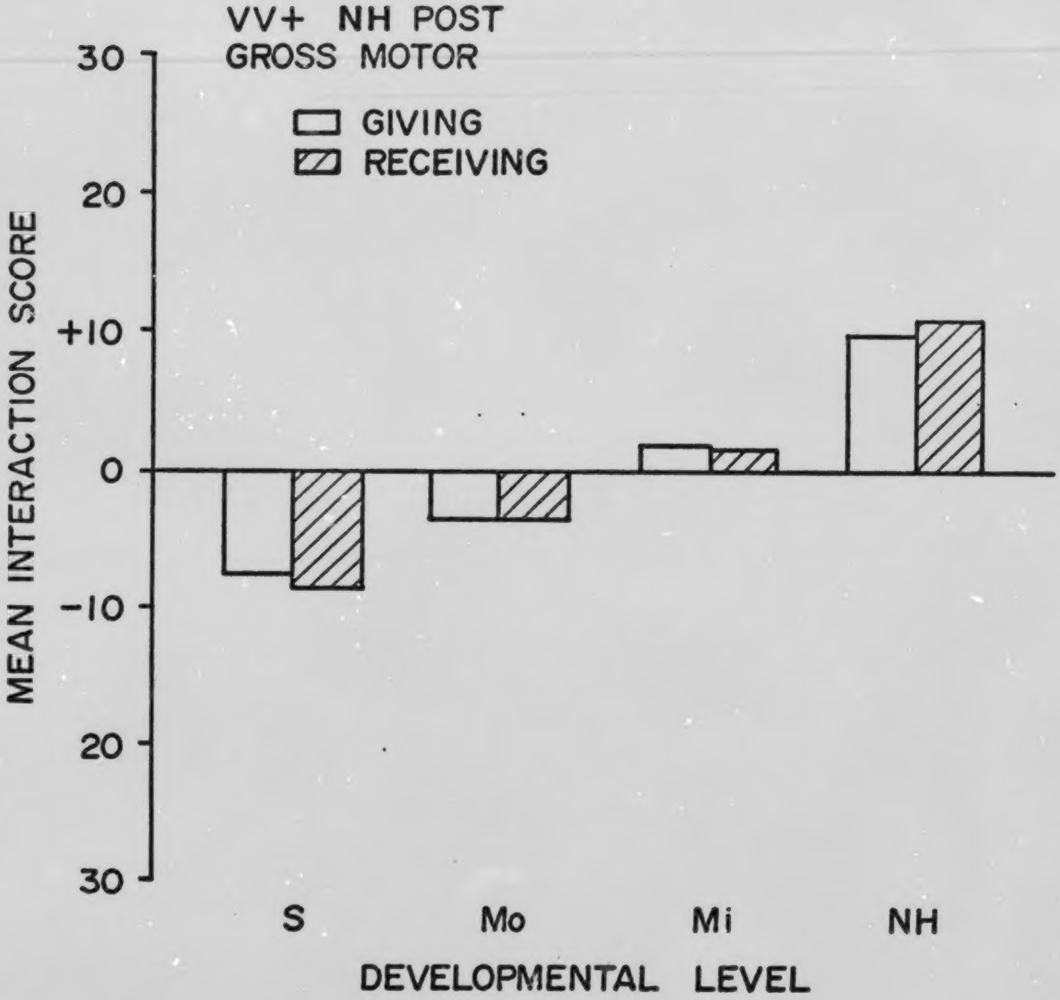

MG+ S POST
GROSS MOTOR
☐ GIVING
▨ RECEIVING
30
20
+10
0
−10
20
30
MEAN INTERACTION SCORE
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 96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GROSS MOTOR
☐ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
30
20
+10
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-10
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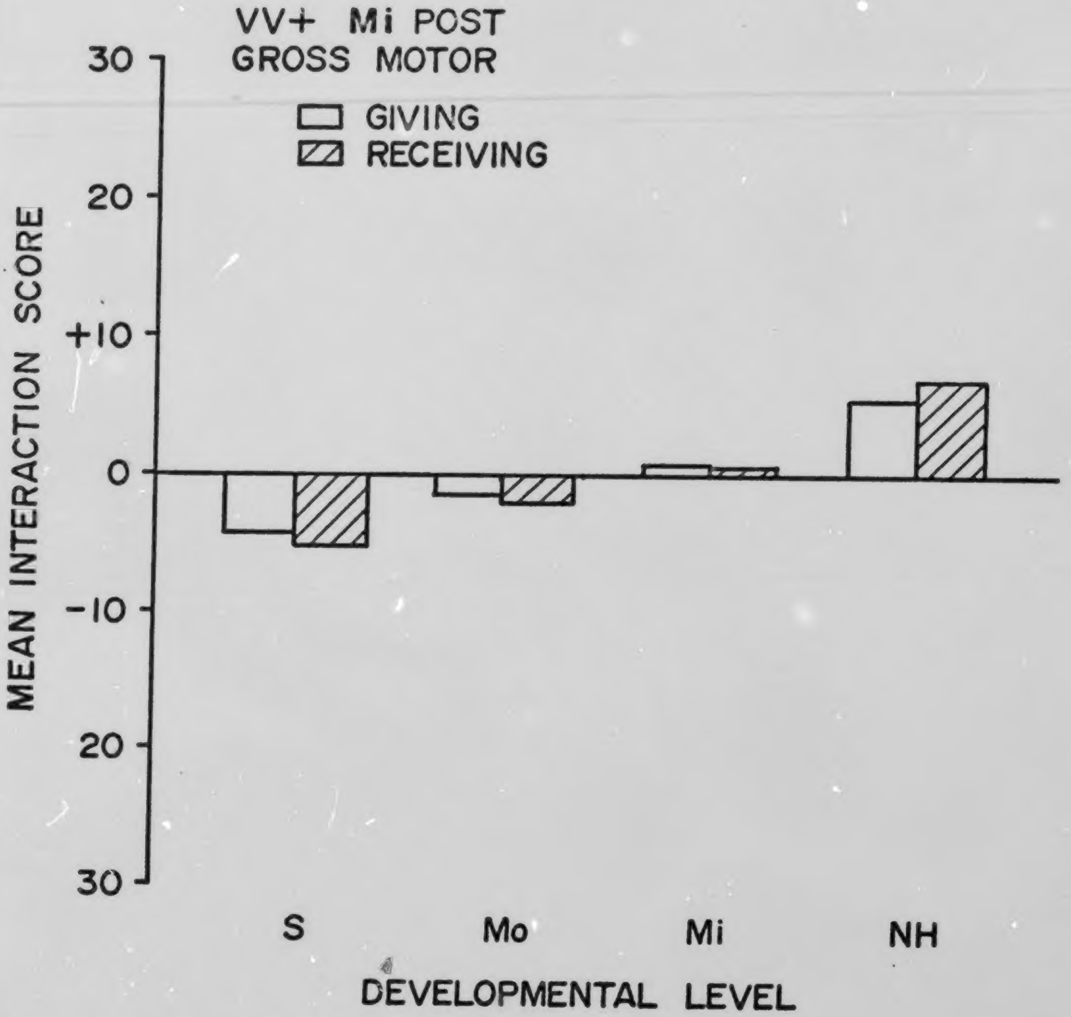
30
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 97


VV+ Mi POST
GROSS MOTOR
□ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
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+10
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Mo
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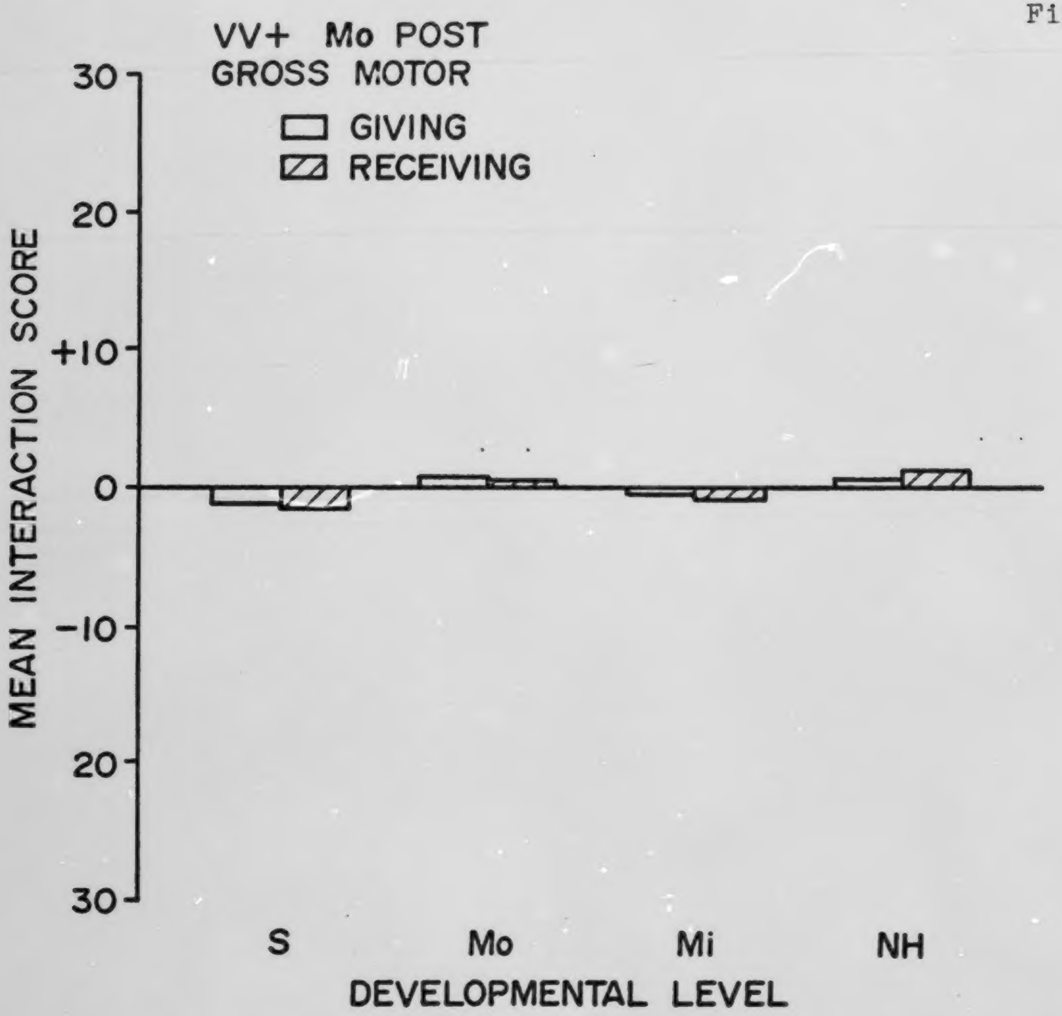
NH
DEVELOPMENTAL LEVEL

Fig. 98


VV+ Mo POST
GROSS MOTOR
GIVING
RECEIVING
MEAN INTERACTION SCORE
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+10
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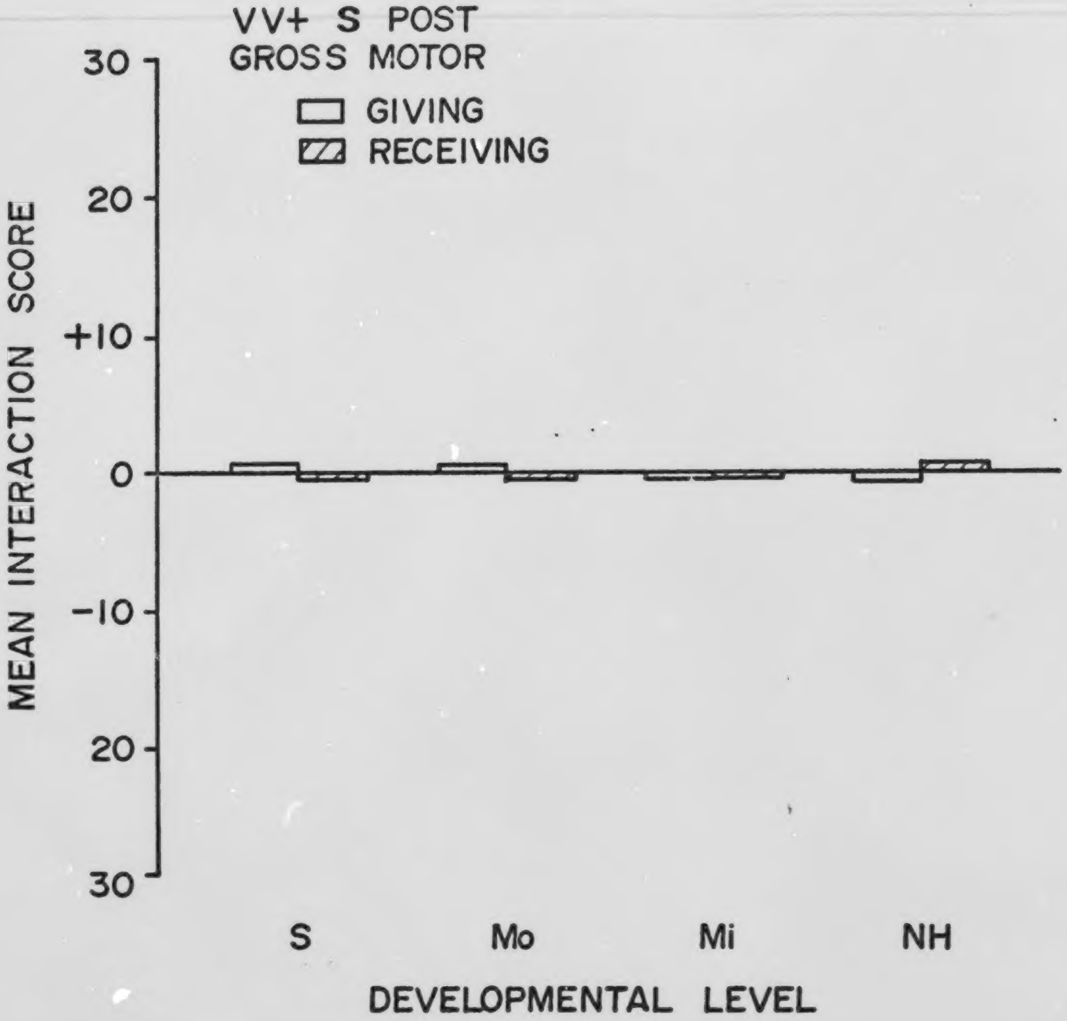
NH
DEVELOPMENTAL LEVEL

Fig. 99


VV+ S POST
GROSS MOTOR
GIVING
RECEIVING
MEAN INTERACTION SCORE
30
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+10
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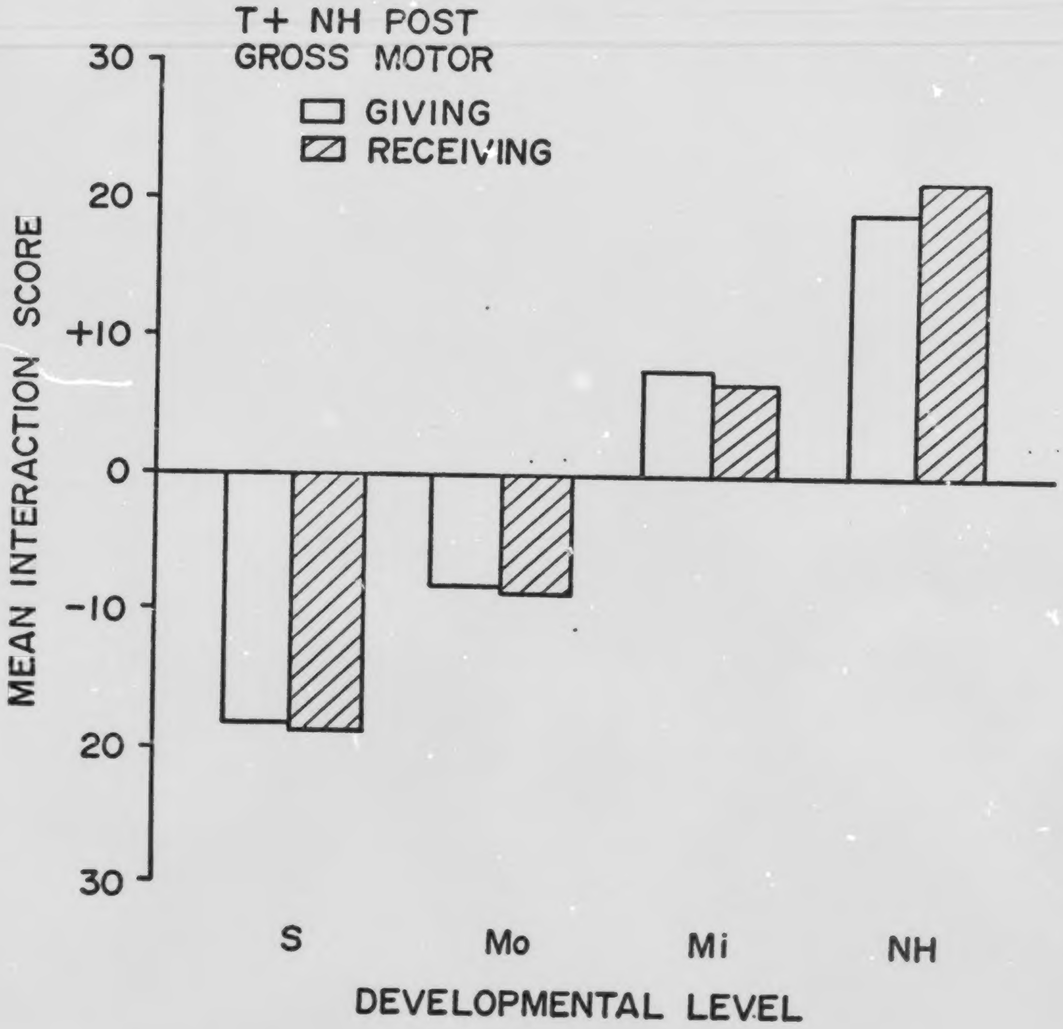
DEVELOPMENTAL LEVEL

Fig. 100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GROSS MOTOR
☐ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
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+10
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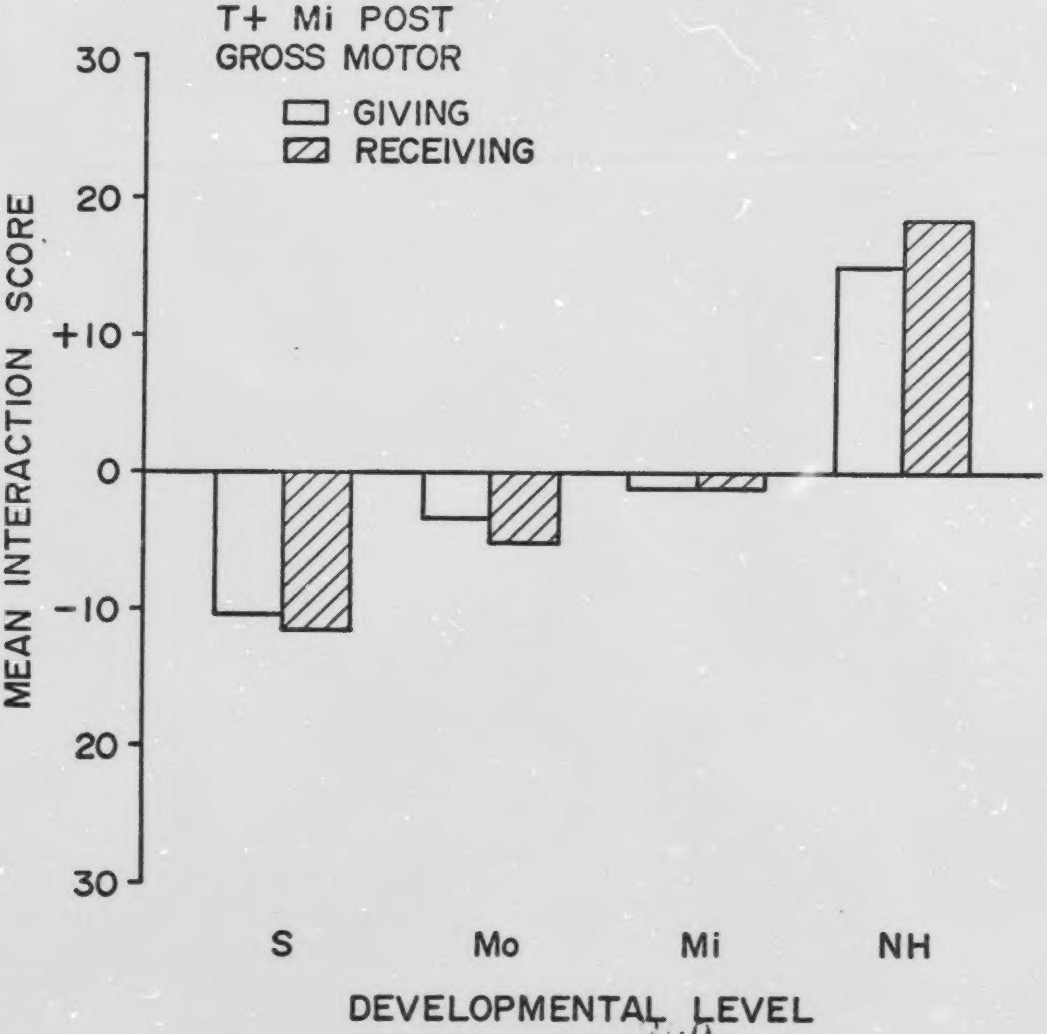
NH
DEVELOPMENTAL LEVEL

Fig. 101


T+ Mi POST
GROSS MOTOR
☐ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
30
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+10
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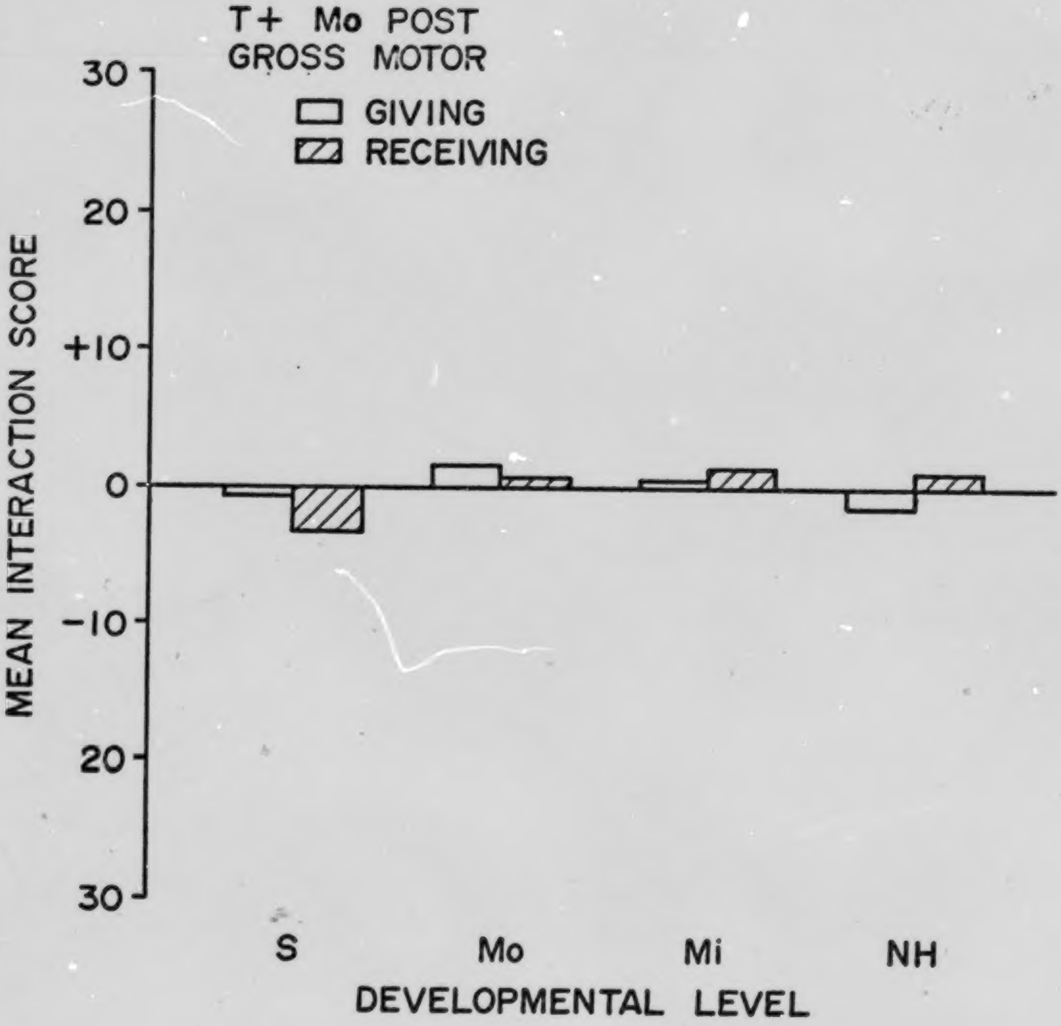
NH
DEVELOPMENTAL LEVEL

Fig. 102


T+ Mo POST
GROSS MOTOR
☐ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
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+10
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-10
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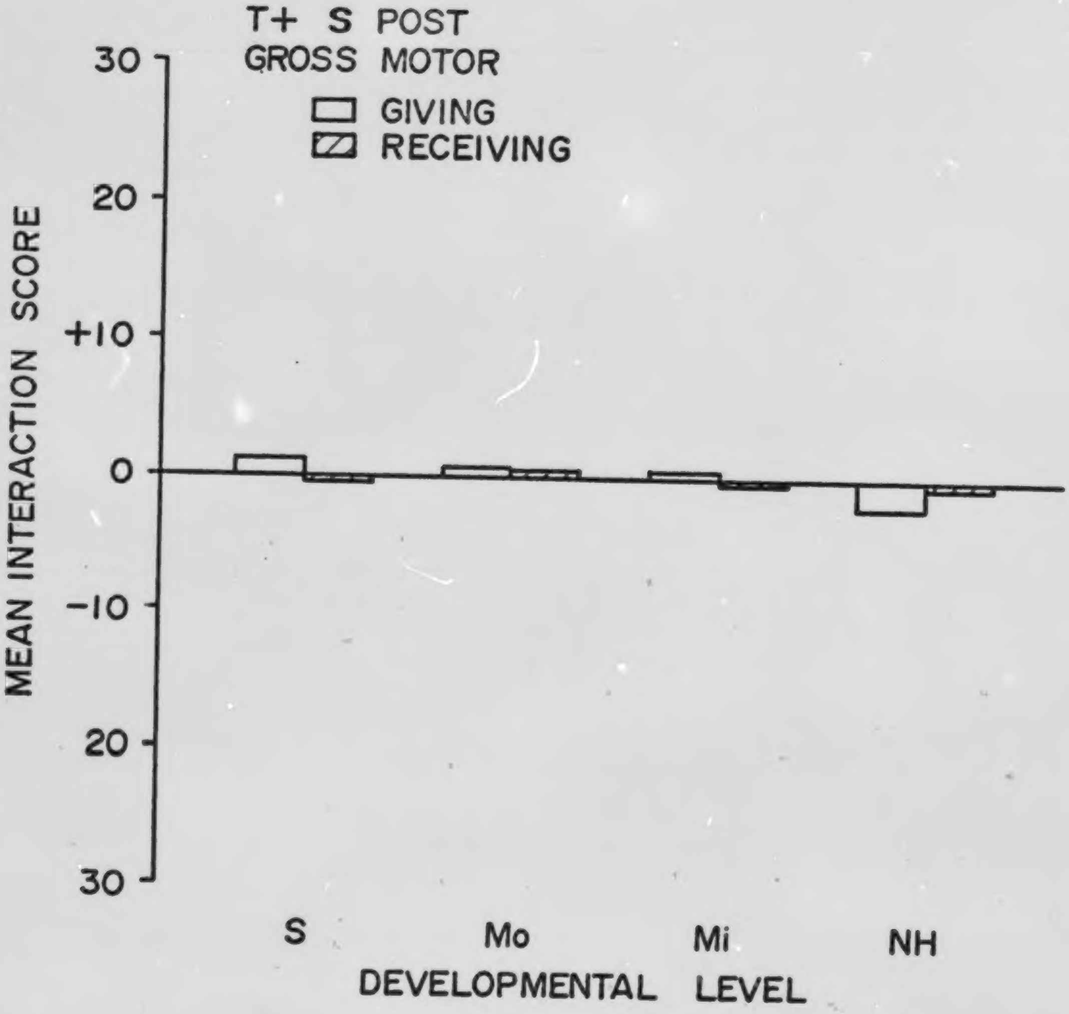
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 103


T+ S POST
GROSS MOTOR
☐ GIVING
▨ RECEIVING
MEAN INTERACTION SCORE
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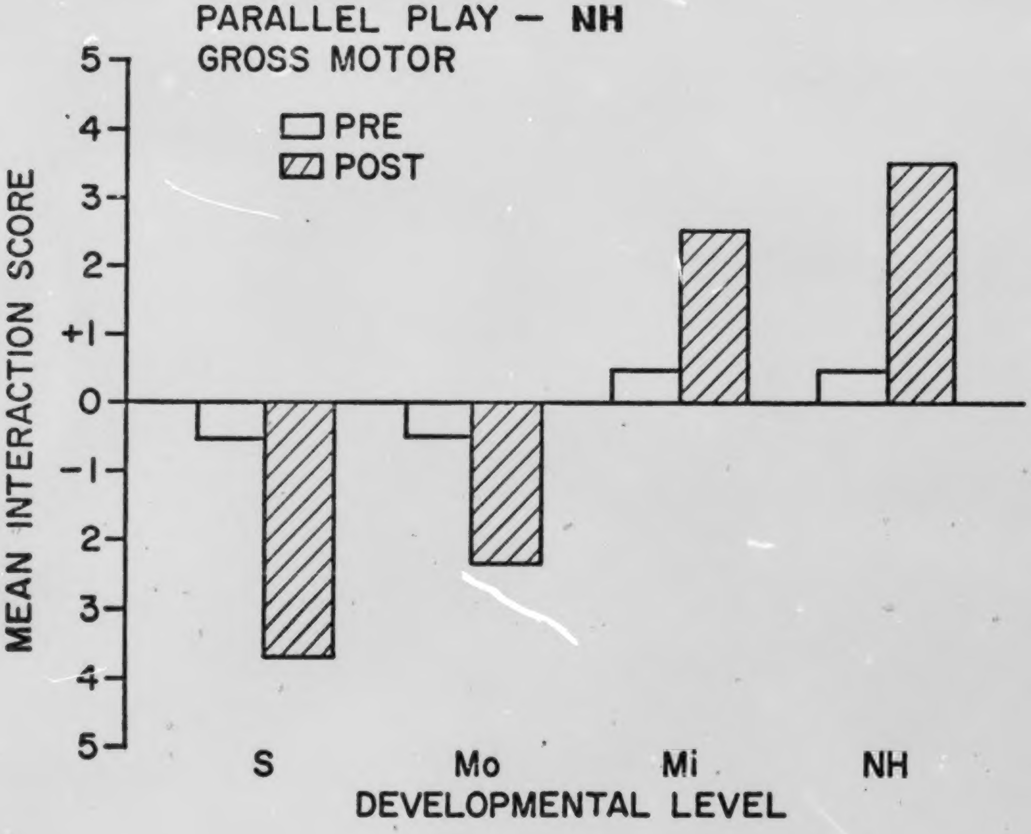
NH
DEVELOPMENTAL LEVEL

Fig. 104



PARALLEL PLAY — **NH**
GROSS MOTOR
PRE
POST
MEAN INTERACTION SCORE
5
4
3
2
+1
0
-1
2
3
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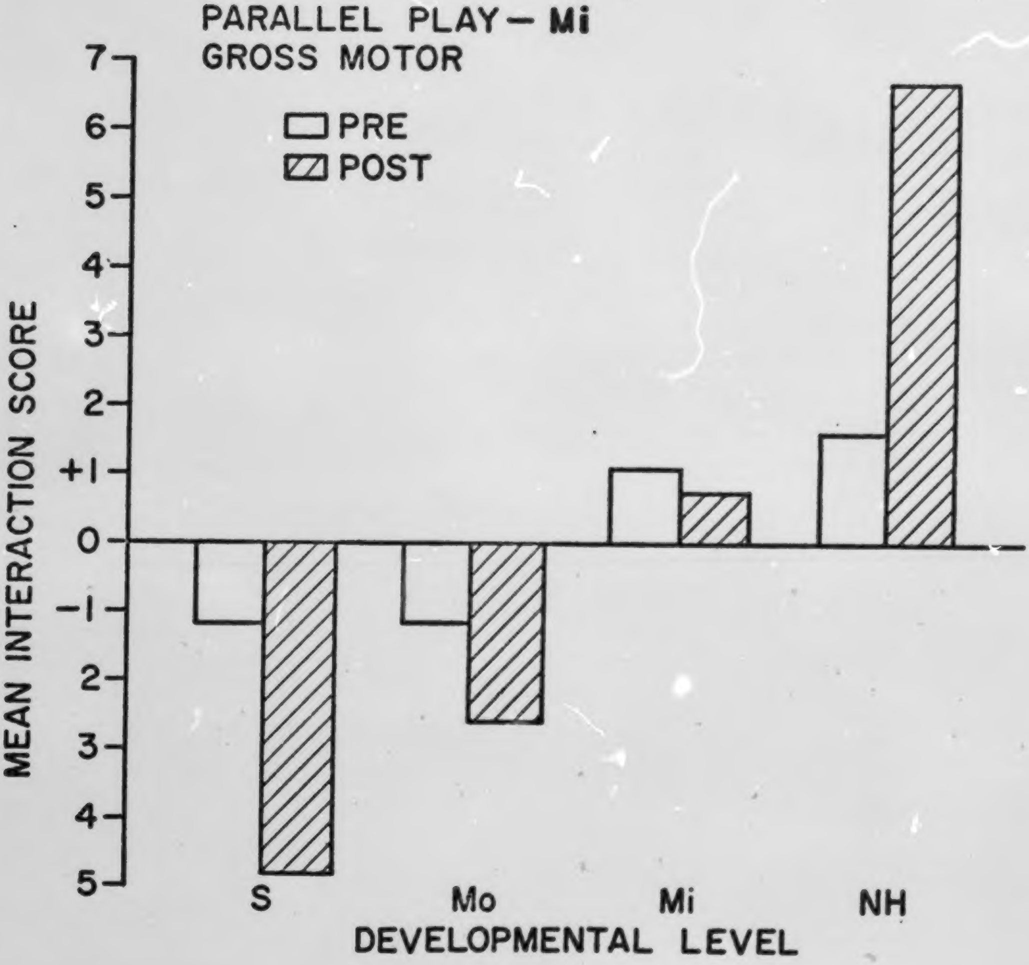
5
S
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 105


PARALLEL PLAY — Mi
GROSS MOTOR
PRE
POST
MEAN INTERACTION SCORE
7
6
5
4
3
2
+1
0
-1
2
3
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5
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Mo
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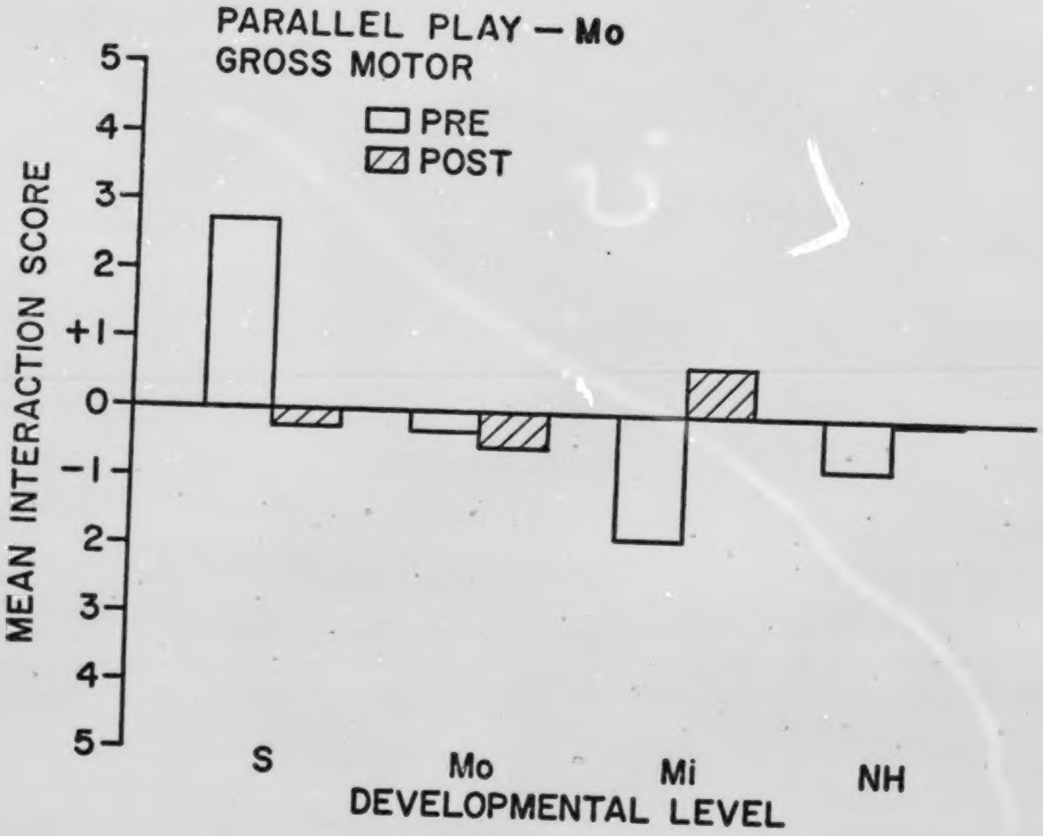
NH
DEVELOPMENTAL LEVEL

Fig. 1


PARALLEL PLAY — Mo
GROSS MOTOR
PRE
POST
MEAN INTERACTION SCORE
5
4
3
2
+1
0
-1
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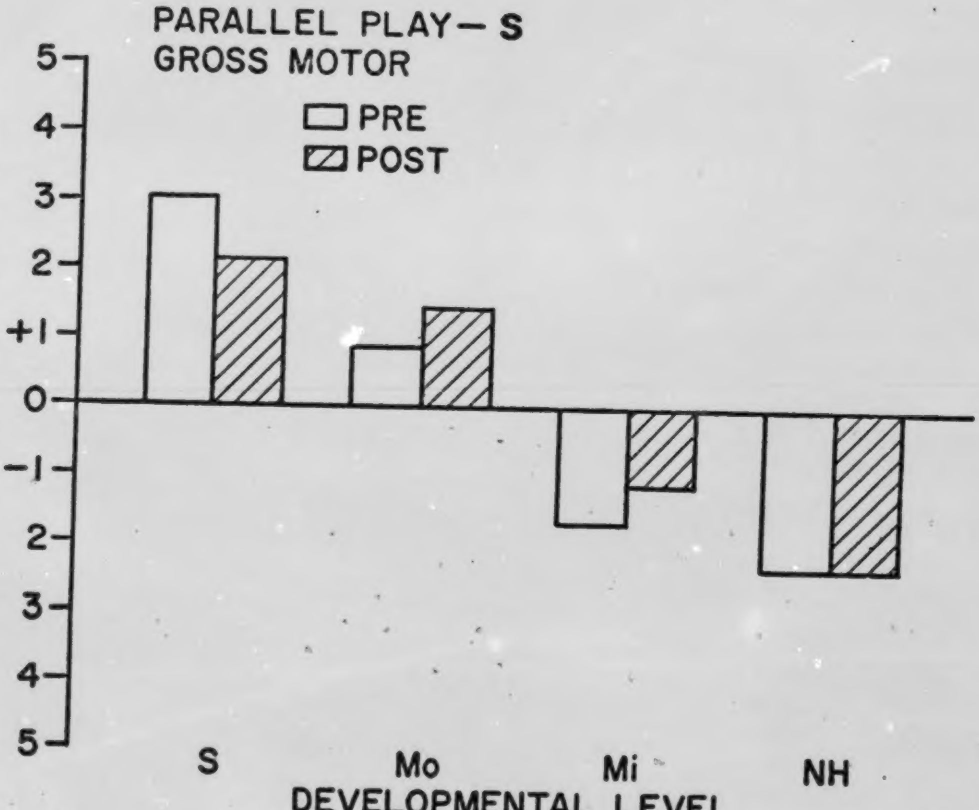
Mo
Mi
NH
DEVELOPMENTAL LEVEL

Fig. 107


PARALLEL PLAY— S
GROSS MOTOR
▭ PRE
▨ POST
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DEVELOPMENTAL LEVEL

APPENDIX

Scores for Individual Children for Each

Developmental Group - Pre

Nonhandicapped

		General Developmental Measures		Language Measures	
Child[1]	C.A.	MSCA	PPVT	Preschool Language Scale	MLU
1	5-1	90	90	110	4.70
2	5-4	66	80	83	4.70
3	5-6	88	116	94	5.40
4	4-8	91	92	115	5.09
5	4-9	82	102	108	5.73
6	4-5	97	83	106	4.17
7	4-4	102	100	107	5.56
8	4-11	99	103	107	5.41
9	5-8	98	97	122	6.26
10	5-1	102	110	117	7.15
11	4-10	110	104	122	5.69
12	4-1	120	95	119	5.82

---

[1] C.A. = chronological age; MSCA = McCarthy Scales of Children's Abilities; PPVT = Peabody Picture Vocabulary Test; MLU = Mean length of utterance

Scores for Individual Children for Each

Developmental Group - Pre

Mild

		General Developmental Measures		Language Measures	
Child[1]	C.A.	MSCA	PPVT	Preschool Language Scale	MLU
1	5-10	<50	82	76	4.79
2	6-1	<50	40	80	4.45
3	6-6	51	65	70	5.98
4	6-0	<50	<45	67	4.43
5	6-3	70	74	90	5.50
6	5-2	73	69	88	5.45
7	6-5	<50	59	46	2.69
8	4-9	82	70	91	4.29
9	6-6	68	63	94	5.46

[1] C.A. = chronological age; MSCA = McCarthy Scales of Children's Abilities; PPVT = Peabody Picture Vocabulary Test; MLU = Mean length of utterance

Scores for Individual Children for Each Developmental Group - Pre

Moderate

		General Developmental Measures		Language Measures	
Child[1]	C.A.	MSCA	PPVT	Preschool Language Scale	MLU
1	5-9	<50	<10	51	4.78
2	5-9	<50	55	62	2.18
3	5-1	29[3]	N.A.[2]	49	4.29
4	6-5	<22	45	44	3.34
5	5-10	<50	23	57	4.07

[1] C.A. = chronological age; MSCA = McCarthy Scales of Children's Abilities; PPVT = Peabody Picture Vocabulary Test; MLU = Mean length of utterance

[2] Vision problems

[3] Stanford-Binet IQ

Scores for Individual Children for Each
Developmental Group - Pre
Severe

		General Developmental Measures	Language Measures		
Child[1]	C.A.	Stanford-Binet	PPVT	Preschool Language Scale	MLU
1	4-1	57	N.B.[2]	56	1.96
2	5-8	N.B.	N.B.	N.B.	N.V.[3]
3	4-8	N.B.	N.B.	N.B.	N.V.
4	6-11	39	21	39	1.32
5	6-11	N.B.	N.B.	N.B.	N.V.
6	6-4	31	N.B.	35	N.V.
7	4-5	<50[4]	N.B.	55	3.23
8	4-2	N.B.	N.B.	N.B.	N.V.
9	6-3	33	11	43	1.63
10	4-8	N.B.	N.B.	N.B.	N.V.
11	4-0	N.B.	N.B.	N.B.	N.V.

[1] C.A. = chronological age; PPVT = Peabody Picture Vocabulary Test

[2] Not reach basal level

[3] Nonverbal

[4] MSCA

Scores for Individual Children for Each Developmental Group - Post

Nonhandicapped

	General Developmental Measures		Language Measures	
Child[1]	MSCA	PPVT	Preschool Language Scale	MLU
1	99	78	100	5.19
2	71	72	84	6.48
3	99	95	96	6.64
4	102	116	101	5.97
5	93	101	108	6.10
6	104	101	108	5.61
7	96	103	115	5.62
8	109	89	107	5.78
9	109	87	111	7.03
10	103	123	105	7.93
11	110	123	114	6.07
12	118	125	117	6.36

[1] MSCA = McCarthy Scales of Children's Abilities; PPVT = Peabody Picture Vocabulary Test; MLU = Mean length of utterance

Scores for Individual Children for Each Developmental Group - Post

Mild

	General Developmental Measures		Language Measures	
Child[1]	MSCA	PPVT	Preschool Language Scale	MLU
1	58	87	76	5.48
2	53	45	79	4.13
3	<50	71	71	5.89
4	<50	67	63	4.58
5	70	59	81	6.56
6	93	72	96	6.22
7	<50	55	63	3.42
8	81	99	94	4.90
9	90	77	92	6.22

[1] MSCA = McCarthy Scales of Children's Abilities; PPVT = Peabody Picture Vocabulary Test; MLU = Mean length of utterance

Scores for Individual Children for Each

Developmental Group - Post

Moderate

Child[1]	General Developmental Measures		Language Measures	
	MSCA	PPVT	Preschool Language Scale	MLU
1	<50	32	47	5.19
2	<50	26	70	3.55
3	39[3]	N.A.[2]	38	4.89
4	<50	63	46	4.19
5	<50	32	56	3.97

[1] MSCA = McCarthy Scales of Children's Abilities; PPVT = Peabody Picture Vocabulary Test; MLU = Mean length of utterance

[2] No basal; vision problems

[3] Stanford-Binet IQ

Scores for Individual Children for Each Developmental Group - Post

Severe

	General Developmental Measures		Language Measures	
Child[1]	Stanford-Binet	PPVT	Preschool Language Scale	MLU
1	64	51	61	3.52
2	<24	N.B.[2]	N.B.	N.V.[3]
3	<24	N.B.	38	N.V.
4	42	32	35	1.94
5	<27	N.B.	26	N.V.
6	31	N.B.	37	N.V.
7	<50[4]	N.B.	60	4.00
8	28	N.B.	N.B.	N.V.
9	34	N.B.	36	<2.00[5]
10	24	N.B.	N.B.	N.V.
11	N.B.	N.B.	N.B.	N.V.

[1] PPVT = Peabody Picture Vocabulary Test; MLU = Mean length of utterance

[2] Not reach basal level

[3] Nonverbal

[4] MSCA

[5] Insufficient number of utterances collected to be definitive

TABLE X

Comparisons Among the Developmental Groups for Measures of General Developmental Level and Language Development - Post Measures

Group	General Development MSCA	General Development PPVT	Language Development Preschool Language Scale	Language Development MLU
Nonhandicapped	101.1	101.1	105.5	6.2
Mild	66.1[3]	70.2	79.4	5.3
Moderate	___[4]	38.2[5]	51.4	4.2
Severe	37.1[6]	___[7]	37.6[8]	<1.00[9]

[1] All data represent means.

[2] MSCA = McCarthy Scale of Children's Abilities; PPVT = Peabody Picture Vocabulary Test; MLU = Mean length of utterance.

[3] An estimate for two children is included in the mean due to the fact that they scored below the lowest range of the scales.

[4] Eighty percent of the children did not reach the lowest level of the scales.

[5] One child could not be tested due to visual problems.

[6] Based on Stanford-Binet results from six children. One child failed to reach basal level, three scored less than 27 (below age scale values), and one scored less than 50 on the MSCA.

[7] Only two children reached basal level.

[8] Based on results from seven children. Four did not reach basal level.

[9] Seven children were functionally nonverbal.

STUDY II

A major concern of educators and program planners is that integrated environments may prove to be too complex for the less developmentally advanced children. This is of particular concern for language interactions that develop among children at different developmental levels where extensive adjustments must occur in order to achieve effective communication.

The significance of adjustments in this regard can be understood by reference to the communicative adjustments made by mothers of normally developing children in accordance with their child's level of development. In general, language addressed to younger children is simpler, more redundant, focuses on immediate events in the child's environment, and contains few disfluencies. It has been suggested that among other functions, these adjustments are designed such that they: (1) facilitate learning the grammatical system, (2) obtain the attention of the child, (3) probe for understanding, and (4) initiate and sustain interactions (see Moerk, 1977; Snow, 1977; and Snow & Ferguson, 1977). In fact, Moerk (1977) points out that "...maternal techniques are almost optimally fit for the instruction of all types of linguistic skills"(p.255).

Most of the data that have led to these conclusions is correlational in nature and provides only presumptive evidence (Broen, 1972; Snow, 1972). The recent work of Cross (1977) provides an example of this approach. In this study, Cross correlated a variety of listener variables (of children ranging in age from 19-32 months) such as mean length of utterance (MLU), maximum MLU, receptive ability, comprehensibility, and conversational vocabulary with a large number of variables derived from the interactions of mothers. The selected maternal variables were divided into the following categories: (a) discourse features, (b) referential characteristics, (c) conversational style, and (d) syntactic features. The results revealed a substantial number of significant correlations between mother and child variables that reflected a pattern leading to the conclusion that, "In general, the input to rapidly developing children is graded quite continuously in tune with their linguistic and communicative abilities" (p. 163). This comment was particularly true for discourse features of mothers' speech and it appears that adjustments in discourse features may well facilitate the child's language learning. Cross summarizes this by stating,

> Thus, the vast majority of the expressions the child learns encode events that are perceptually, cognitively, and semantically available and salient to the child. If we add the ingredient that the least mature children received significantly larger proportions of most of these categories, we can begin to understand why these children were acquiring language so rapidly. (p.169)

Although similar adjustments for certain syntactic categories were not as evident (see also Newport, Gleitman, & Gleitman, 1977) a gross correspondence between child and maternal variables was noted, and in general appeared to be sufficiently closely aligned to suggest a facilitative effect.

Returning to the issue of child-child interactions, it is important to ask, first, whether children make similar adjustments when addressing children of different ages who are developing normally, and second, whether these modifications occur for children in integrated settings when addressing children of similar chronological age but differing widely in developmental level.

With regard to the first question, research by Shatz and Gelman (1973) has established that 4-year-old children do indeed make adjustments similar to those described above (see also Sachs & Devin, 1976) when addressing adults, 4-year-olds, and 2-year-olds. In fact, the 4-year-old children were capable of relatively fine distinctions and adjustments on the basis of the developmental level of the listener. This is illustrated by the finding that the 4-year-olds addressed "older" 2-year-olds differently than "younger" 2-year-olds. For example, "When subordinate conjunctions and predicate complements with 'that' and 'wh' complementizers did occur with 2-year-old listeners, they occurred exclusively in the speech addressed to children who were 28 months or older" (p. 20).

Extending their original work, Gelman and Shatz (1977) reanalyzed the 4-year-olds' speech from their 1973 report focusing exclusively on complex sentences containing "that" and "wh" predicate complements. Dividing each utterance into one of five functional categories (directing the interaction, mental state, modulation of assertion, clarification, and requests for new information or clarification), they compared the speech of the

4-year-olds to 2-year-olds and adults in toy task and unstructured situations. As expected, major differences occurred in the speech directed to adults compared to 2-year-olds. For example, in the toy task, 95% of the utterances to 2-year-olds were functionally classified as directing the interaction, with only 25% so classified for adults. Further analyses indicated that, in relation to 2-year-olds, the 4-year-olds were directive, used short, attention-type demonstration utterances, and made little use of conversational devices (e.g., 0% for modulation of assertion). It was also noted that the use of the complex utterance classes and the occurrence of the functional meaning-in-conversation categories varied as a function of situational demands.

Interpretation of these and other patterns by Gelman and Shatz provided further support for the proposition that relatively fine adjustments occur in the communicative interactions of young children and that these adjustments are appropriate. Although recognizing circumstances in which syntactic simplicity results directly from the speaker's intent to teach syntax to the language learning child, Shatz and Gelman point out that the concept of the "appropriateness" of the adjustments is perhaps best understood within a broader sociolinguistic context. They state:

> We see that the variable use of that and wh constructions was systematically controlled by the conversational constraints with which the children had to deal. What the children chose to say when they used such constructions was constrained by their listeners' status, cognitive capacity,

> and attentiveness and by the flexibility of the setting. From our point of view, then, the children were trying to produce messages that could be understood or responded to by the different listener classes. They adjusted the content of their messages. Likewise, they varied their use of conventional linguistic devices in response both to setting and to listener. In short, their speech was appropriate. (pp. 46-47)

As discussed earlier, the question of similar child-child adjustments occurring when the listeners are similar in age but differ widely in terms of developmental level is the focus of this study. Although feedback is often the key to these adjustments (Gleason, 1977), the fact is that handicapped children pose unique problems in terms of cues (e.g., a lack of a correlation between physical size and comprehension ability).

The only available evidence to date on this issue, however, does suggest that somewhat similar adjustments do occur. Analyzing the speech of normally developing preschool children when addressing mildly, moderately, and severely handicapped children as well as other nonhandicapped peers in both instructional and free play settings, Guralnick and Paul-Brown (1977) found that MLU, complex utterances, repetitions and a variety of other linguistic parameters varied as a function of the developmental level of the listener. Analyses of the adjustment patterns, although revealing slight variations between the two settings, suggested that these differences reflected appropriate communicative changes which may well have positive developmental value. It appeared that the speech of the nonhandicapped children was sufficiently adapted to insure communication yet provide adequate variation and complexity to generate a press for development (see Mahoney & Seely, 1977).

It must be admitted that the work of Guralnick and Paul-Brown (1977) provided only a first approximation, focusing almost exclusively on analyses of structural variables. Two needs are apparent--first, to replicate the original study with a larger group of subjects, and second, to extend the analysis to include functional as well as structural categories in addition to obtaining data reflecting various qualitative features of the interaction. Accordingly, the interactions of nonhandicapped children were recorded when addressing children of different developmental levels in an instructional setting. These interactions were analyzed in terms of major structural categories reflecting linguistic productivity, complexity, and diversity, as well as various interaction characteristics. Utterances were also analyzed in terms of their function in the communicative interaction. Categories for this dimension included behavior requests, informational statements, informational requests, and an assessment of the relevance of the utterance to the instructional situation and the mutuality of interactions. Of particular interest in this study were the possible interactions that might occur between the structural, interaction, and functional measures and their relationship to the appropriateness of communicative adjustments.

Method

Subjects

Eight nonhandicapped and 12 handicapped children currently enrolled in the integrated preschool program were selected for participation in the study.[1] For purposes of this study, the 12 handicapped children were selected such that four children each could be classified as mildly, moderately, or severely handicapped generally in accordance with the criteria stated in the American Association on Mental Deficiency's manual on classification and terminology (Grossman, 1973). Classification, however, was based jointly on mean length of utterances (MLU) and IQ (Peabody Picture Vocabulary Test). Nonhandicapped children scored above 85 on the PPVT with an MLU greater than 4.00. For children to be classified as mildly handicapped, an MLU greater than 4.00 was also required but the IQ score ranged between 52 and 75. For moderately handicapped children, the joint occurrence of IQs ranging between 40 and 51 with MLUs greater than 2.00 was required. Similarly, MLUs of less than 1.00 and IQ scores less than 35 were required for classification in the severely handicapped group. In fact all children in this group were functionally nonverbal. The mean IQs (and chronological ages) for the nonhandicapped, mild, moderate, and severe groups were 103.4 (5-0), 61.5 (5-2), 46.2 (4-10), and 21.7 (5-10), respectively. Mean MLU scores for the same groups were 5.2, 4.5, 3.2, and less than 1.0, respectively.

Experimental design

Each of the eight nonhandicapped children served as tutors and were randomly paired with mildly, moderately, and severely handicapped companions (one from each group) for instructional sessions (see below). Since we were interested in the interactions between nonhandicapped children and children at varying developmental levels, each developmental category was considered an experimental condition (tutor-companion pair) for both design and analysis purposes. The order in which each nonhandicapped child was paired with each of the three handicapped children was randomly determined with the restriction that representatives from each handicapped group appeared an equal number of times at each position in the sequence as was possible. Since there were eight nonhandicapped children and only four children in each of the handicapped groups, each of the handicapped children was associated with two nonhandicapped tutors. Consequently, each companion child served in that capacity in two instructional sessions.

---

[1] In actuality, these data were obtained immediately prior to the grant award at the end of the preceding year. Following the grant award, we proceeded to transcribe the tapes and begin the series of analyses.

An additional experimental condition was introduced following the completion of this phase of the experiment. Specifically, in order to obtain an estimate of how nonhandicapped children interact with other nonhandicapped children in an instructional situation, each of the eight nonhandicapped children was paired with one of the other nonhandicapped children (comprising a new tutor-companion pair of nonhandicapped children) and followed the same procedures. Each nonhandicapped child served once as a tutor and once as companion for this segment of the experiment.

We recognized that interaction data obtained in this manner are potentially subject to confounding through order effects. However, given the limited number of nonhandicapped children in the setting, (halving the N would have been necessary to comply with strict randomization of order for the four groups, i.e., nonhandicapped, mild, moderate, and severe) and the fact that order effects tend to be minimal in these situations (see Shatz & Gelman, 1973), we elected to obtain the interaction data for nonhandicapped children addressing other nonhandicapped children immediately following their interactions with children in the other developmental groups. Consequently, four experimental conditions were identified and the results analyzed accordingly.

Procedure

Each tutor was given the task of teaching the companion child how to play with a particular toy. The instructions to the tutor were, "I have a new toy I think you would like to play with. (Companion child's name) is coming soon but now is your chance to use it and see how it works." Prior to each session, the tutor was given an opportunity to play with the toy for five to ten minutes. During this time the experimenter answered any questions, and demonstrated appropriate toy use if it was apparent that the child was having difficulty. Verbal explanations were kept to a minimum.

Three toys were selected for instructional sessions and were assigned randomly to each tutor-companion pair with the following restrictions: (1) toys were paired with equal frequency (to the extent possible) for each of the three groups of handicapped children, (2) no toy was given to the same handicapped child twice, and (3) each of the eight nonhandicapped tutors used a different toy for each of their three instructional sessions with children at different developmental levels.

Two other toys were selected randomly for use by nonhandicapped children in their interaction with the other nonhandicapped children. Specifically, each nonhandicapped child served once as a tutor and once as a companion. Children were paired randomly for these sessions with the restriction that a particular child could not be paired with the same child when that child was both a tutor and companion. Similarly, toy assignments were arranged such that if a given child was a tutor for one toy, another toy would be used when that child served as a companion. Accordingly, separate toys were used when nonhandicapped children were paired with one another in order to ensure that each toy was different for all groups. In addition, this eliminated any possible influence that might have existed from either hearing oneself talk while demonstrating how to use a given toy or hearing another (nonhandicapped child) talk while demonstrating.

The selection of the five toys (three for each of the handicapped groups and two for the nonhandicapped children's interactions) was based on criteria noted by Shatz and Gelman (1973) such that: (1) there was sufficient structural complexity and movable parts that both children could play simultaneously with the toys, (2) that each toy would be of interest to children of varying developmental levels, and (3) that the toys were novel as far as we could determine (Shatz & Gelman, 1973, p. 7). The actual toys selected and the manufacturers were: (1) Shape School - Child Guidance, (2) Fishing Boat - Playskool, (3) Ski Lift - Creative Playthings, (4) Sesame Street - Fisher-Price, and (5) Rescue Center - Playskool

Each session took place in a small playroom, lasted 15 minutes, and began immediately following the five- to ten-minute toy exploration time. The experimenter said, "(Companion child's name) is coming soon. Do you think he/she will like this toy? I don't think he's ever seen it before. When he comes, you tell him how to work it. You'll have to tell him, and not just show him, to make sure he really understands. Tell him so he can work it, too" (instructions taken from Shatz & Gelman, 1973, p. 8). When the companion child entered, the experimenter explained about the toy and that the tutor child would show him how to use it. In addition, the tutor child was reminded of the task.

The experimenter prompted the tutor if no interactions occurred for 20 seconds. General statements such as, "Don't forget to tell him how to work it" were addressed to the tutor. The experimenter remained present during the entire 15-minute session.

Recordings and transcription

Each 15-minute instructional session was videotaped from an adjacent room through a one-way glass using a Sony Videocorder (Model AV-3650) and Sony Condenser microphones (Model ECM-16). Recordings were transcribed according to Schiefelbusch's (1963) criteria. Although both the tutor and companion's speech were transcribed, only the tutor's speech was used for analysis at this time. Comments to adults were not included in the analysis. Reliability was obtained by having an independent rater and one experimenter view 25% of the tapes and then compute percentage agreement. For utterance boundaries and markers, mean reliability for the sample of tapes was 78.8% (range 68.6% - 88.9%), and

81% (range 70.6% - 88.2%) for word agreement. The final protocols used for analysis were based on decisions resulting from discussion of disagreements after returning to sections of the tapes where disagreement occurred.

Linguistic parameters and analysis of the data

A wide variety of linguistic parameters designed to reflect verbal productivity, diversity of speech, grammatical complexity, and various functional aspects of speech of the nonhandicapped children were chosen for analysis. In addition, measures designed to reflect certain characteristics of the interaction were obtained, including dominance of the interaction, repetitions, and the nature of any nonverbal assistance. In all cases, each utterance served as the unit for analysis. A listing of the fundamental measures, their definitions as described by previous investigators (see Source), and our modification of these definitions or new definitions can be found in Table 1.

Insert Table 1 about here

The five major functional categories were: (I) behavior requests, (II) informational statements--mutual, (III) utterances not relevant to toy interaction but mutual, (IV) informational requests, and (V) nonmutual utterances. In most instances, the various parameters were analyzed in terms of how they were distributed across the functional categories (I-V). (Please note that frequently I-IV was used since category V was nonmutual speech.) Although frequency of occurrence was of

TABLE 1

Linguistic Parameters: Their Sources and Definitions

LINGUISTIC PARAMETER	SOURCE	DEFINITIONS, MODIFICATIONS AND/OR EXPLANATION
1. Words	Schiefelbusch, 1963 (Appendix I)	Definition: Same
2. Utterances	Schiefelbusch, 1963 (Appendix II) Disfluences: See Bloodstein, A Handbook on Stuttering, National Easter Seal Society for Crippled Children and Adults, 1969, p. 5 citing Johnson, Wendall and Associates, The Onset of Stuttering; Minneapolis: University of Minnesota Press, 1959.	Definition: Same Modification: An utterance which starts out as a question but ends in a statement is counted as a statement. Also, if the child starts but does not finish a word or phrase, only the revised utterance is counted. In addition, disfluent types of speech behavior are eliminated. These include: - interjections; - part word repetitions of syllables and sounds; - word repetitions; - phrase repetition of two or more words; and - revisions: modification of a phrase
3. Mean length of utterance (MLU)--words	Schiefelbusch, 1963	Definition: Same
4. Long utterances	Shatz and Gelman, 1973	Definition: Same (Utterances five words in length or over) with Modification: When a word or phrase is repeated within the same utterance for emphasis, the utterance is not counted as long even if it is over five words. Example: "no no no no no" "like that like that like that"

LINGUISTIC PARAMETER	SOURCE	DEFINITIONS, MODIFICATI AND/OR EXPLANATIONS
5. Complex utterances	a. Coordinate constructions: Shatz and Gelman, 1973, in addition to "null," Tyack and Gottsleben, 1974, and "or" constructions, Lee, 1974 b. Subordinate conjunctions: Shatz and Gelman, 1973, in addition to "before," "since," and "null," Tyack and Gottsleben, 1974 c. Relative clauses: Shatz and Gelman, 1973; Tyack and Gottsleben, 1974 d. "that" and "wh" complementizers: Shatz and Gelman, 1973; Tyack and Gottsleben, 1974 e. Infinitives: Shatz and Gelman, 1973: Tyack and Gottsleben, 1974	Definition: Same Explanation: Utterances are selected from utterance lengths that exceed four words and constitut the sum total of coordinate constructions, subor dinate conjunctions, rel tive clauses formed afte either the object or subject noun, "that" and "w complementizers, and inf tives. Utterances can c tain more than one comple construction.
6. Preverb words	Snow, 1972	Definition: Same Modification: In interrogative reversals, the subject and verb are tra posed to count preverb words.
7. Clauses	Standard	Definition: Same
8. Type-token ratio	Broen, 1972	Definition: Same Modification: No restri tions of sample size.
9. Modifiers	Standard	Definition: Same Modification: Possessiv demonstratives, and articles are not counted. M ifiers repeated for emph sis in the same utteranc are only counted twice.

LINGUISTIC PARAMETER	SOURCE	DEFINITIONS, MODIFICATIO AND/OR EXPLANATIONS
10. Repetitions	Broen, 1972; Snow, 1972	Definition: Same Explanation and Modification: Repetitions consis of complete (exact), modified, or semantic repetitions of the tutor's own utterance. To classify a a repetition, the same meaning must be retained. To be so classified, an utterance must be within three utterances of the tutor's own utterance. A added restriction is that only five intervening utterances (either tutor's or companion child's) can occur for an utterance to be classified as a repetition. Excluded as repetitions are a series of separate instructions not requiring an immediate response and/or statements identifying a separate series of objects or even even though the same content words have been repeated. The child, for example, might be successively saying, "and these," "and these," pointing to various components
11. Behavior requests	Nelson, 1973, Mahoney and Seely, 1976	Definition and Explanatio Behavior requests are utte ances, relevant to the toy interaction, that consist of directions, instructio demands, or clear suggestions to the companion chi To be counted as such, the utterance must contain a request for the other chil to respond immediately, either motorically or verbally. Examples include: "Put it over there," "Come here," "Robert" (meaning "Look"), as well as negative directions such as, "Stop it" or "Don't do that." Also included are "I want" statements ~~to~~ th

LINGUISTIC PARAMETER	SOURCE	DEFINITIONS, MODIFICATIONS AND/OR EXPLANATIONS
11. Behavior requests, (Continued)		other child that require an immediate response and modified imperatives with question form such as, " don't you close the door? or "Will you stop it?" Any modified imperative that clearly implies a behavior request is so categorized.
12. Informational statements--mutual	Nelson, 1973; Mahoney and Seely, 1976	Definition and Explanatio Informational statements are used for the purpose of mutual information exchange or for interaction relevant to the toy interaction. They consist of terances that provide information or description, or comments relevant to t toy interaction. The utt ances can be instructiona or noninstructional in nature. Utterances are cat gorized as mutual interactions when children are making eye contact or whe communication is clearly indicated through gesture or comment, or when the children are engaged in a sequence of activities together. Utterances direc to the toy, or spoken in role of the toy, are coun as informational statemen when the exchange is mutu
13. Utterances not relevant to the toy interaction, but mutual	General	Definition: Utterances consisting of behavior requests, informational statements or informationa requests that are not relevant to the toy interactio but are mutual.
14. Informational requests	Nelson, 1973; Mahoney and Seely, 1976	Definition and Explanatior Informational requests are utterances, relevant to th toy interaction, judged as questions due to rising intonation or grammatical structure. Modified imperatives with a question for

LINGUISTIC PARAMETER	SOURCE	DEFINITIONS, MODIFICATIONS, AND/OR EXPLANATIONS
1 Informational requests (Continued)		such as, "Why don't you do it?"are not informational requests. Questions posed in a role playing situation directed to and requiring a answer from the companion child who may also be in th role of a toy are counted a informational requests.
15. Nonmutual utterances	General	Definition: Nonmutual utter ances consist of utterances by children playing by them selves, self-speech, and fantasy comments that do no relate to interactions with the companion child. Included here are nonmutual utterances which would othe wise be classified as behavior requests, informatio al statements, or informational requests.
16. Nonverbal assistance	General	Definition: Any nonverbal behavior designed to clarif or enhance the meaning of a utterance. Includes (1) a demonstration or modeling b the tutor of some relevant aspect of the task, (2) an exemplification, i.e., poin ing to an object or (3) phy ical guidance, i.e., helping or physically guiding the companion child to carry ou an activity. Example: Movi the companion child's hand across a portion of a toy or gently guiding the companion to the toy.
17. Utterance order--alternating	General	Definition: Utterances directed to the companion child which follow the companion child's utterance within five seconds with no other intervening utterances.

interest, proportions were derived for most fundamental measures in order to provide a basis for comparison that was independent of speech productivity. In all instances, the functional categories were treated as independent variables along with developmental level. This permitted an assessment of differences related to the functional categories and a determination of any interactions between functional categories and developmental level for each structural and interaction parameter. Accordingly, for each parameter a repeated measures analysis of variance (ANOVA) was carried out. In most cases, this consisted of a 4(developmental level) x 4(functional category) ANOVA (or a 4 x 5 ANOVA if functional categories I-V were used). Occasionally, however, data were collapsed across functional categories and a simple one way repeated measures ANOVA was carried out (e.g., for type-token-ratio modifiers). The same analysis was used for nonstructural measures such as conversational dominance and order of utterances. Table 2 lists the analyses that were carried out.

Insert Table 2 about here

Reliability

Reliability for the functional, structural, and interaction parameters was obtained by having an independent rater and the experimenter judge each category and calculate percentage agreement. Reliability for classification of utterances into functional categories was 87%. For structural and other measures, reliability was also high, ranging from 82% to 90%.

TABLE 2

List of Analyses[1]

Productivity

1. Utterances--total
2. Utterances/total utterances
3. Words--total
4. Words/total words

Complexity

5. MLU
6. Long utterances--total
7. Total long/total utterances
8. Complex--total
9. Total complex/total long
10. Total complex/total utterances
11. Total preverb words/total clauses[2]

Diversity

12. Type-token-ratio (TTR)
13. Modifiers--total
14. Total modifiers/total words
15. TTR modifiers[2]

Interaction Characteristics

16. Total NH utterances/total utterances (companion and tutor)
17. Total utterances--alternating[2]
18. Repetitions--total
19. Total repetitions/total utterances
20. Total nonverbal assistance/total behavior requests[2]
21. Total nonverbal assistance/total informational statements[2]

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[1] Unless otherwise indicated the data for each variable listed above was distributed over the four (or five) functional categories to permit a 4(5) x 4(DL) repeated measures ANOVA to be carried out.

[2] Data collapsed over functional categories and a one way ANOVA (for developmental level) was carried out.

Results

Table 3 presents the major results of the twenty-one analyses that were conducted. For productivity measures, total utterances[2] revealed significant effects for functional category (categ), F(4,28) = 31.60, $p < .001$ and the categ x DL interaction, F(12,84) = 2.85, $p < .005$, although the main effect for DL was not significant. For total words, significant effects for DL, F(3,21) = 6.07, $p < .005$, categ, F(3,21) = 29.72, $p < .001$, and the interaction term F(9,63) = 3.83 were obtained.

Insert Table 3 about here

As can be determined by reference to Table 3, the number of utterances to children of varying developmental levels were similar on an absolute basis for all functional categories except informational statements. Accordingly, not only were utterances classified most frequently as informational statements, but they also increased in frequency with increasing developmental level of the listener. A similar pattern was noted for total words, although the main effect for total words did reach statistical significance.

When transforming the frequency data to proportions of utterances or words for each functional category, a slightly different pattern emerged. For utterances, a 5 x 4 ANOVA revealed significant effects for categ, F(3,21) = 45.06, $p < .001$ and the categ x DL interaction, F(12,84) = 3.80, $p < .001$. As the table indicates, the proportion of utterances classified as behavior

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[2] Analysis consisted of a 5 x 4 ANOVA

TABLE 3

Communications by Nonhandicapped Children for Each Linguistic Parameter as a Function of Developmental Level of Peer and Functional Category*

Linguistic Parameter	Developmental Level of Peer			
	NH	Mi	Mo	S
1. Utterances--total[1,3] Functional category				
I	27.63	37.50	47.38	43.25
II	95.63	105.63	66.50	53.75
III	6.63	6.38	13.38	8.63
IV	17.38	16.50	7.00	5.25
V	15.25	16.75	20.13	32.75
2. Utterances/total utterances[1,3] Functional category				
I	.1974	.2396	.3465	.4646
II	.6619	.6603	.5342	.4218
III	.0575	.0416	.0803	.0718
IV	.1223	.0983	.0575	.0433
V	.0955	.1055	.1557	.2520
3. Words--total[1,2,3] Functional category				
I	102.0	149.13	154.88	125.38
II	464.88	582.25	306.13	210.25
III	32.88	37.00	62.13	25.13
IV	48.63	47.50	23.75	17.75
4. Words/total words[1,3] Functional category				
I	.1619	.2021	.2769	.3495
II	.6954	.6899	.5879	.4910
III	.0633	.0493	.0694	.0591
IV	.0770	.0572	.0543	.0412

Linguistic Parameter	Developmental Level of Peer			
	NH	Mi	Mo	S
5. MLU^{1,2,3} Functional category				
I	3.77	4.06	3.25	2.82
II	4.80	5.24	4.46	4.11
III	3.20	5.07	2.15	1.64
IV	2.82	3.35	3.99	1.89
V	3.31	3.90	3.34	4.00
6. Long utterances--total^{1,2,3} Functional category				
I	6.63	13.13	11.88	7.25
II	47.50	55.63	27.88	18.63
III	2.88	3.38	6.25	1.50
IV	2.13	3.25	2.50	1.63
7 Total long/total utterances^{1,2,3} Functional category				
I	.0470	.0824	.0839	.0644
II	.3275	.3305	.2085	.1514
III	.0259	.0221	.0342	.0082
IV	.0149	.0184	.0224	.0158
8. Complex--total^{1,2,3} Functional category				
I	4.13	8.88	4.88	2.50
II	30.38	42.38	19.38	8.00
III	2.00	1.88	3.13	0.25
IV	1.50	2.00	2.38	1.38
9. Total complex/total long^{1,3} Functional category				
I	.0770	.1299	.0897	.0915
II	.4942	.4665	.3624	.2298
III	.0489	.0268	.0327	.0059
IV	.0251	.0227	.0568	.0671

Linguistic Parameter	Developmental Level of Peer			
	NH	Mi	Mo	S
1[illegible] Total complex/total utterances[1,2,3] Functional category				
I	.0304	.0572	.0329	.0188
II	.2070	.2427	.1313	.0617
III	.0182	.0121	.0171	.0014
IV	.0103	.0113	.0209	.0139
11. Total preverb words/total clauses Functional category				
I-IV	1.57	1.56	1.50	1.65
12. Type-token-ratio (TTR)[1] Functional category				
I	.4765	.3714	.4215	.3826
II	.3118	.2575	.3259	.3866
III	.7079	.6992	.4889	.4453
IV	.5894	.5128	.5798	.3081
13. Modifiers--total[1,2,3] Functional category				
I	12.38	23.25	25.88	17.88
II	82.63	100.25	49.00	41.13
III	5.63	4.13	10.63	1.88
IV	8.38	11.88	4.5	2.25
14. Total modifiers/total words[1] Functional category				
I	.0194	.0287	.0452	.0571
II	.1220	.1158	.0994	.1019
III	.0108	.0053	.0130	.0031
IV	.0119	.0123	.0062	.0049
15. TTR modifiers Functional category				
I-IV	.3200	.2890	.3273	.3892

Linguistic Parameter	Developmental Level of Peer			
	NH	Mi	Mo	S
Total NH utterances/total utterances (companion & tutor)[2] Functional category				
I-IV	.5645	.6801	.7120	.8734
17. Proportion alternating utterances[2] Functional category				
I-IV	.4245	.2771	.2461	.0968
18. Repetitions--total[1,3] Functional category				
I	5.75	8.00	16.00	14.63
II	14.5	14.75	11.50	8.13
III	1.13	1.38	3.00	3.00
IV	2.13	1.88	0.63	1.13
19. Total repetitions/total utterances[1,3] Functional category				
I	.0422	.0520	.1121	.1637
II	.1008	.0949	.1082	.0744
III	.0102	.0092	.0189	.0224
IV	.0144	.0119	.0060	.0096
20. Total nonverbal assistance/ total behavior requests Functional category				
I-IV	.4358	.4047	.4445	.4419
21. Total nonverbal assistance/ total informational statements Functional category				
I-IV	.4894	.6238	.6353	.6351

*All data represent means.

[1] $\underline{p} < .05$ for the functional category variable.

[2] $\underline{p} < .05$ for the developmental level variable.

[3] $\underline{p} < .05$ for the interaction term.

requests decreased quite rapidly as developmental level increased as did the proportion of non-mutual interactions. A quite different pattern was observed for the proportion of informational statements and informational requests, which increased for the more advanced children. No trend for non-relevant statements occurred.

For the proportion of total words, the analyses revealed significant effects for categ, $F(3,21) = 95.39$, $p < .001$ and the categ x DL interaction, $F(9,63) = 2.37$, $p < .05$. Once again the proportion of words classified as informational statements increased with DL and the proportion of behavior requests decreased. Changes in the other categories did not indicate consistent trends.

A wide variety of measures were included to assess any changes in the complexity of language that might occur as a function of DL or category of speech. For MLU (words), significant effects for DL, $F(3,21) = 6.76$, $p < .005$, categ, $F(4,28) = 8.25$, $p < .001$, and the DL x categ interaction $F(12,84) = 2.13$, $p < .05$ were obtained. As expected, MLU was greater to the more advanced children with the overall means, summed across functional category, being 3.31, 4.02, 4.97, and 4.57 to S, Mo, Mi, and NH children, respectively. Informational statements consistently produced the highest MLUs followed by behavior requests. A variety of interactions between categ and DL were also evident, but appeared to be spurious in many instances reflecting the fact that some categories were utilized infrequently.

For total long utterances, significant differences were obtained for DL, $F(3,21) = 6.19$, $p < .01$, categ, $F(3,21) = 33.05$, $p < .001$, and the interaction term F(9,63) = 4.04, $p < .001$. As anticipated, more long utterances were addressed to the more advanced children overall, but mainly reflected the contribution of long utterances categorized as informational statements. In fact, for the other functional categories, little change across DL levels was observed.

Similarly, for the proportion of long utterances, significant effects for DL, F(3,21) = 8.47, $p < .001$, categ F(3,21) = 81.66, $p < .001$, and the interaction term, F(9,63) = 3.63, $p < .005$ were obtained. The proportion of long utterances for informational statements increased with DL but did not change for the other functional categories in any consistent manner.

Three different measures were used to evaluate those long utterances that were complex sentences. First, for total complex, significant effects for DL, F(3,21) = 5.69, $p < .01$, categ, F(3,21) = 10.98, $p < .001$, and the interaction term, F(9,63) = 3.91, $p < .001$ were obtained. More complex utterances were addressed to more advanced children for informational statements, but little change occurred for the other functional categories. Moreover, complex utterances occurred most frequently in the form of informational statements.

Second, an analysis of the proportion of complex utterances per total utterances for each functional category revealed exactly the same pattern. Significant effects for DL, F(3,21) = 5.67, $p < .01$, categ, F(3,21) = 19.90, $p < .001$ and the interaction term F(9,63) = 3.18, $p < .001$ were obtained.

Finally, looking at the proportion of long utterances that were complex utterances for each category, the results indicated significant effects only for the functional category variable, F(3,21) = 30.28, $p < .001$ and the interaction term F(9,63) = 2.54, $p < .025$. As noted in Table 3, the proportion of long informational statements that were complex more than doubled, to nearly 50%, when addressing nonhandicapped children compared to severely handicapped children.

The last measure of complexity, the proportion of pre-verb words per clause, did not yield differences for any of the variables.

Type-token-ratio was the key measure used to evaluate the diversity of speech. The 4 x 4 ANOVA revealed a significant effect only for categ, F(3,21) = 7.80, $p < .005$. Accordingly, TTR did not vary as a function of the listener although, on the average, TTR varied for the different categories from lowest to highest in the following order: informational statements, behavior requests, informational requests, and non-relevant utterances.

An analysis of the frequency of usage of modifiers revealed significant effects for DL, F(3,21) = 3.71, $p < .05$, categ, F(3,21) = 24.14, $p < .001$, and the interaction term, F(9,63) = 2.56, $p < .025$. The frequency of use increased as a function of increasing DL for informational statements, although no changes were noted for the other functional categories. Focusing on the proportion of modifiers per total words for each category, the analysis revealed only a significant categ effect, F(3,21) = 82.03, $p < .001$. This result reflected the greater proportion of modifiers used in informational statements than the other categories. Finally, the analysis for TTR modifiers summed over the functional categories did not reach significance.

The final major category for analysis, interaction characteristics, was designed to assess any adjustments that might occur in a variety of conversational characteristics as a function of the developmental level of the listener. As expected, the conversation was dominated (measured in terms of the proportion of the NH child's speech to the combined total of the NH and companion child's utterances) by NH children when addressing the less advanced children, $F(3,21) = 7.11$, $p < .005$, with the conversation being about equally shared when addressing other NH children. Instead of analyzing the total speech, a somewhat different perspective is obtained when looking at reciprocal "turn taking" interactions. Accordingly, the proportion of "alternating" utterances was analyzed, i.e., those which followed the companion child's utterances with no other utterances intervening. Also as expected, this proportion increased with increasing DL, $F(3,21) = 6.92$, $p < .005$, reaching nearly complete reciprocity (50%) when interacting with other NH children.

The analysis of the frequency of "own" repetitions revealed a particularly interesting pattern. The ANOVA revealed significant effects for categ, $F(3,21) = 15.81$, $p < .001$ and for the interaction term, $F(9,63) = 2.59$, $p < .025$. As noted by inspection of the table, the frequency of behavior requests that were repeated decreased as a function of increasing DL, whereas this frequency increased for informational statements. This general pattern was retained when transforming the frequency of repetitions to proportion of repetitions for each category. The 4 x 4 ANOVA revealed significant effects for categ, F(3,21) = 15.81, $p < .001$ and the interaction term, F(9,63) = 2.59, $p < .05$. However, the proportion of repetitions that were informational statements increased only between the severe and other groups, with no differences among Mo, Mi, and NH.

The final two interaction measures were designed to assess changes in nonverbal assistance associated with the developmental level of the listener. Separate analyses for the proportion of nonverbal assistance for behavioral requests and informational statements did not reveal any statistically reliable differences although there was a tendency for the proportion of nonverbal assistance for informational statements to be higher for the less advanced children.

Discussion

Functional, structural, and interaction analyses for the various parameters clearly revealed that nonhandicapped children adapted their speech in accordance with the developmental level of the listener. Although a number of findings were equivocal, it appears that these adjustments were indeed appropriate, i.e., they tended to increase the likelihood that messages would be understood and responded to and were generally consistent with the communicative goals of the speaker. In fact, in many ways these adjustments parallel those made by mothers when addressing children of various stages of language development (Broen, 1972; Moerk, 1977; Snow, 1972;Snow & Ferguson, 1977).

As in an earlier study (Guralnick and Paul-Brown, 1977), the productivity, complexity, and diversity of nonhandicapped children's speech increased directly with the developmental level of the listener. For complexity, more long and more complex utterances were addressed to the more advanced children. Mean length of utterance also showed a similar pattern of adjustment but it is interesting to note that the MLU for behavior requests was significantly lower than that for informational statements. Although both functional categories did reveal an increase in MLU for more advanced listeners, these differences were of a similar order of magnitude to the differences in MLU between these two categories (mean MLU for behavior requests and informational statements were 3.48 and 4.65, respectively). Accordingly, since proportionally more behavior requests were directed to the less advanced children, the lower overall MLU addressed to them in part reflects the greater contribution of the lower MLU associated with behavior requests.

As noted, these changes in the complexity of speech appear to reflect appropriate adjustments on the part of the speaker that increase the likelihood that the communication will be understood. Ideally, one might expect that communication would be maximized if the speakers adjusted their utterance length and other related characteristics in a manner in which the proportion of speech or proportional differences for the various parameters were maintained at the same or similar levels across all levels of listener. For example, Moerk (1975) did obtain proportional differences of MLU between the speech of mothers and their children across a reasonably wide range of age levels, although the differences did decrease with increasing age. However, in the study reported here, proportionality was not maintained for either length or for complexity of utterances. In general, for both of these measures, the proportion increased with increasing developmental level of the listener. A similar increase was noted for the proportion of complex utterances that were long utterances.

It should be noted that although average MLU differences did occur, a relatively wide distribution of utterance lengths was addressed even to the least advanced children (see Figure 1). Consequently, it is likely that this diversity was helpful in pressing for comprehension of longer and more complex utterances while maintaining an overall level of complexity compatible with the listener's developmental level.

In contrast to the complexity measures, proportionality was maintained for all measures of diversity. Neither overall TTR nor TTR for modifiers varied as a function of the level of the listener. The same result was obtained for the proportion of modifiers per total words, although the absolute number of modifiers did increase, at least for informational statements, in the expected direction.

An interesting pattern was also obtained as a result of the analyses of the proportion of total speech for the functional categories. Specifically, the proportion of utterances decreased for behavior requests and nonmutual utterances as more advanced children were addressed. In contrast, the proportion of speech categorized as informational statements and informational requests increased to those groups. No changes were noted for the proportion of nonrelevant utterances.

The differences in the usage of these categories appears to reflect appropriate adjustments given the context, the role of the speaker, and the cognitive level of the listener. Specifically, it seems reasonable to suggest that, given the limited verbal repertoire of the less advanced children, the nonhandicapped tutors used compliance with behavior requests, rather than questions, as a means of probing for comprehension of the companion child. Similarly, in conformance with their role as tutors(which was likely to be more strongly adopted when interacting with the less advanced companions) a tendency to use behavior requests and other directive interactions more frequently would be expected (see Gelman & Shatz, 1977). Finally, from a practical perspective, extended information exchange, even when accompanied by demonstrations (note that nonverbal assistance had a combined average of approximately 50% for behavior requests and informational statements) is not as effective an instructional strategy for children with limited comprehension abilities. On the other hand, a greater number of questions, a greater proportion of mutual interactions, more extensive information exchanges, but fewer behavior requests seem appropriate when addressing the more advanced children.

The analysis of interaction characteristics further supports the contention that the nonhandicapped children appropriately adjusted their communicative interactions. As expected, nonhandicapped children increasingly dominated the interaction as the developmental level of the companion decreased. Similarly, "turn-taking" increased with the level of the listener. The most important interaction characteristic, however, was the proportion of repetitions addressed to each peer group. As noted, the major finding was that the proportion of repeated behavior requests declined sharply from approximately 15% of total utterances for the severely handicapped children to less than 5% for nonhandicapped companions. As analyzed by Gleason (1977), the feedback functions of noncompliance or noncomprehension are likely to result in repetitions and in general to guide the language interactions of the speaker.

Conclusions

In summary, this study supports the contention that, from both a functional and structural perspective, nonhandicapped preschool children make appropriate adjustments when communicating with similar age children of different developmental levels. It appears that even young children are quite sensitive to the abilities of their companions, handicapped or not, and are able to adjust their communicative interactions accordingly. It may well be, as Cross (1977) suggests, that the comprehension level of the listener is the key to these adjustments.

Taken together, these findings lend further support to the potential value and feasibility of integrated programs. The fear of persistent failures by advanced children to make communicative adjustments has not received any empirical support. Certainly it is appropriate now to examine these interactions more closely in an effort to determine the degree of calibration and communicative effectiveness that actually exists ("fine tuning") (see Mahoney, 1975). As Bates (1975) points out, we are likely to find considerable communicative insufficiencies, especially since young speakers often tend to omit adequate information regarding their presuppositions. Moreover, it is necessary to examine the sequential nature of these interactions (such as teaching routines and sub-routines suggested by Moerk, 1977) in order to more adequately assess the potential value of these interactions for facilitating the communication skills of all involved.

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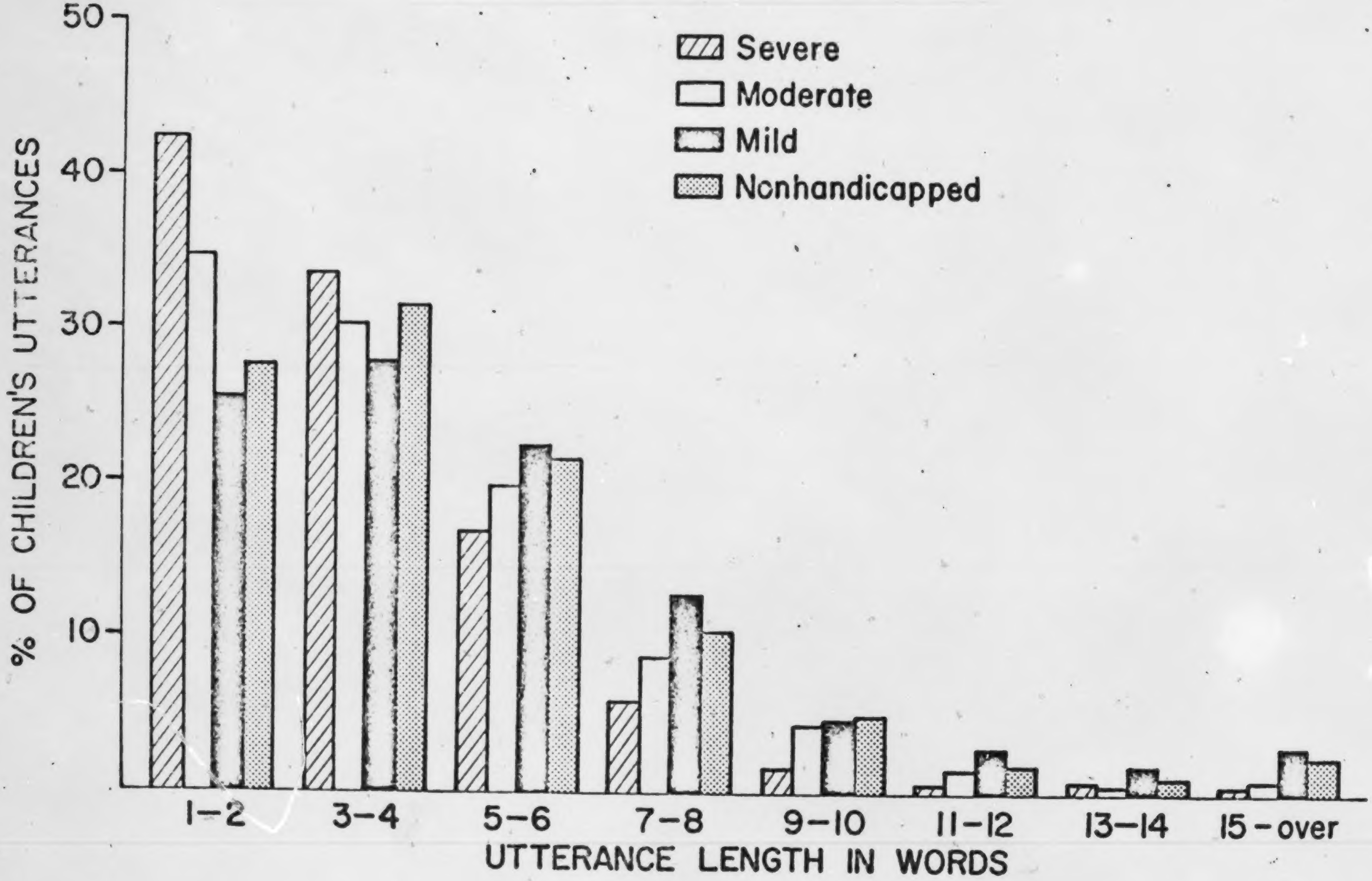
50
40
30
20
10
% OF CHILDREN'S UTTERANCES
Severe
Moderate
Mild
Nonhandicapped
1-2
3-4
5-6
7-8
9-10
11-12
13-14
15-over
UTTERANCE LENGTH IN WORDS

STUDY III

In Study I of this report, advanced children were integrated with less advanced children in an effort to assess the nature of any changes that might occur as a result of this variation in group composition. In that study, general instructions, encouragement, teacher prompting, selection of materials, and arrangements of physical space were all designed to maximize positive interactions among children of different developmental levels. Although many of these activities were planned, and the study could be considered as an investigation of peers as agents of change, they took place at general levels. That is, systematic programs directed towards individual children specifically utilizing advanced peers were not commonly part of the process in Study I.

Within a general integration framework, however, a number of investigators have focused on the planned, systematic use of advanced peers as agents of change (see reviews by McGee, Kauffman, & Nusser, 1977, and Strain, Cooke & Apolloni, 1976). The focus of this change is usually a target behavior or behaviors of a specific child. Essentially, in this procedure, advanced children are selected for involvement from those who evidence appropriate interpersonal and behavioral skills and/or interest in participating in such a process. The nature of peer involvement, the type of activity, or the role adults play can vary widely. One dimension that varies is the degree of training of peers. In some instances only brief instructions are provided and adults usually play a very active role. In other cases, peers are provided with intensive training and most of the burden for carrying out change programs is in their hands. An example of the latter could include training to prompt, model, and provide selective feedback in order to promote more appropriate or advanced behavior on the part of the handicapped child.

The concept of peers as agents of change is important from both theoretical and practical perspectives. It is generally assumed, especially with regard to social play and interpersonal behaviors, that a major advantage of directly utilizing peers in developmental programs is the fact that generalization is facilitated. In addition, the saliency and availability of peers appear to be other factors that can contribute to the potential success of this technique (Guralnick, 1978).

For withdrawn children and other children with relatively circumscribed behavioral difficulties, a number of investigators have demonstrated the effectiveness of utilizing advanced peers as agents of change at the preschool level. In a landmark study, Wahler (1967) demonstrated the power of contingent peer reinforcement in modifying behaviors such as play, speech, and passive and agressive interactions. In this study, "confederate" peers were instructed verbally and participated in role playing exercises to enable them to selectively attend to the behavior of the target peers, but adults played no other direct therapeutic role.

In a related effort, Baer and Wolf (1970) asked nursery school peers to initiate interactions with a withdrawn child. In addition, the teachers also "primed" the withdrawn child to engage in productive play activities. Throughout a series of adjustments in the therapeutic program, a procedure consisting of priming both peers and the withdrawn child as well as reinforcement by teachers for interaction and the gradual fading of adult intervention was very effective. In contrast to Wahler's (1967) work, teachers played an active role in the actual play setting by priming and reinforcing and the advanced peers received no prior training.

A final illustration can be found in the work of Nordquist and Bradley (1973) who enlisted the services of an advanced child to engage in cooperative play with a handicapped child. In doing so, the teachers were then able to reinforce and thereby increase instances of cooperative play, which, in this case, ultimately led to correlated effects of increasing the handicapped child's verbal behavior and general peer interactions. Here contingent teacher attention appeared to be the key variable but its effectiveness was made possible by the involvement of an advanced peer.

Despite these procedural variations, the potential value of peers as agents of change appears to have substantial empirical support--at least for target children with relatively mild and focal social or interpersonal difficulties. It is only recently, however, that extensions of this general approach to children with more severe and widespread deficits have been attempted. For the most part, these efforts have been in response to the increasing numbers of integrated programs and the corresponding efforts to understand the potential developmental value of advanced peers in relation to less advanced children.

Three studies have focused on altering the social interactions or levels of social play of significantly handicapped children through the deliberate and systematic use of nonhandicapped peers.

In a playroom setting, Guralnick (1976) demonstrated that, as a result of the combined techniques of prompting, modeling, and reinforcement, advanced peers were able to increase the amount of associative and cooperative play of handicapped children. In addition, the frequency of positive verbalizations to advanced peers increased as well. Training for the nonhandicapped peers consisted of instructions and role playing in a manner similar to Wahler's (1967) work.

Similarly, Strain, Shores, and Timm (1977) trained nonhandicapped peers to initiate positive social behaviors to two handicapped children in a playroom setting. Utilizing a reversal design, they demonstrated that the positive social approach of the "confederate" peers increased both initiated and responded social behaviors of the handicapped children. Approximately 50% of the positive initiations were directed to the confederate peer.

This study illustrates a number of principles and raises certain important issues as well. First, success of the intervention strategy varied directly with the subjects' initial level of social behavior. Additional training procedures, most likely with strong adult involvement, seem essential for children with severely limited social repertoires. Second, the success of the reversal design suggested the dependence of even social initiations of the handicapped children upon the presence of the nonhandicapped peer. Moreover, none of the studies reviewed above extended measurement of change to other than the playroom situation. Clearly, the generalized impact of this strategy requires further study.

In an effort to answer some of these questions, Strain (1977), in a recent study, replicated his previous work with three handicapped peers and one confederate peer in a playroom. However, the social behavior of the handicapped youngsters was also recorded in free play sessions involving other handicapped peers but these generalization sessions did not include the confederate peer. For the playroom setting, the results successfully replicated earlier work. In addition, generalization to the free play setting also resulted. Specifically, increased social initiations above baseline were observed during intervention periods but were substantially reduced during return to baseline sessions. Moreover, the amount of generalization in terms of total frequency was about half of that observed in the playroom setting.

As pointed out by Strain (1977), part of the reason for the reduction in overall social behavior in the free play setting was probably due to the fact that the additional untrained peers in the playroom setting did not respond to the initiations of the trained peers. However, the dependence of the trained peers' social behaviors upon the presence of the confederate peer is still of concern and has not been adequately addressed.

For the series of studies just reviewed, the intervention strategy consisted of advanced peers as agents of change following training by adults. Direct adult intervention did not occur. In contrast, the studies utilizing advanced peers to help promote imitation of less advanced children involved adults more directly. For example, Guralnick (1976) asked an advanced peer and a handicapped peer to describe a variety of complex pictures. By having the teacher reinforce the more complex sentences of the nonhandicapped peer in the presence of the handicapped child, more advanced speech of that child to both training and generalization pictures was observed.

In a related effort, Apolloni and Cooke (1978) and Apolloni, Cooke, and Cooke (1977) conducted a series of studies designed to increase the imitative skills of handicapped children through peer assistance. Using a procedure referred to as Peer Imitation Training (PIT), they assessed both stimulus and response generalization of toddlers and preschoolers. Adults played an important role prompting and reinforcing delayed children's imitation of selected nonhandicapped children's behaviors. It is important to note that this PIT procedure required a high degree of structure and the social context is generally limited to the primary participants (i.e., teacher, delayed, and nondelayed children). This circumstance probably accounted for the minimal generalization that occurred to a free play setting as well as the finding that the presence of adults appeared critical. However, when direct training was carried out during free play, the adult could be absent while leaving the imitative repertoire intact. Furthermore, they also noted that generalization to different settings was difficult to achieve if nondelayed peers other than the confederate peers were available since they competed for the attention of the advanced peer.

A final study was conducted by Nordquist (1978) in which an autistic child's spontaneous imitations were increased through the assistance of confederate peers. The adults prompted, guided, and praised the efforts of two confederate peers to model behaviors and reinforce an autistic child's imitation of those behaviors during free play in an integrated nursery. His results clearly indicated that spontaneous imitation of nonconfederate peers increased dramatically and that this was directly tied to the intervention procedure. Of major significance is the fact that, although generalization to these untrained peers did occur, Nordquist also reported that a number of undesirable behaviors covaried with the increase in spontaneous imitation. Specifically, rituals and self-stimulation increased and sustained peer interaction decreased. Without question, further studies must look beyond the specific behaviors of interest and attempt to assess those behaviors likely to covary in a significant way.

Taken together, it appears that the gathering of small groups of children of varying developmental levels expressly for the purpose of producing change, especially social interactions in handicapped children, can be a successful intervention strategy. However, a number of major questions remain unresolved. The purpose of this final section is to describe a series of case studies designed to yield information touching upon a variety of issues. Of major interest is the issue of generalizability. This will be explored broadly, gathering data from a wide range of dependent measures to determine the degree of generalizability across settings and to children not initially involved in the training activities. Also investigated will be generalization across different response classes, i.e., the possible covariation of other related behaviors. Of particular interest is the relationship between the frequency of positive social interactions (the typical measure) and a variety of categories of play behavior including both the level of social play participation and constructiveness of play. Of equal importance is the fact that the behaviors of the nonhandicapped as well as the handicapped children will be recorded. All of the studies reviewed above have focused exclusively on changes in the handicapped child, but it is important for us to determine the effects of the intervention strategy on all the participants.

Although this series of case studies can only be considered exploratory, the variety of dependent measures were analyzed across two major dimensions: 1) the severity of handicap of the target children, and 2) the nature of the intervention strategy. With regard to the latter variable, two training packages utilizing peers as agents of change were developed. Package I trained nonhandicapped peers in a playroom setting and assessed changes during free play. Adults were not involved beyond the training sessions. If this strategy was unsuccessful, Package II was implemented which consisted of adult directed prompting and reinforcement of the nonhandicapped and target children directly in the free play situation.

Method

Subjects

Eleven pairs of children from the integrated setting participated. The handicapped children were selected to ensure representation from mild, moderate, and severe groups as well as on the basis of limited social interactions, especially with nonhandicapped children (see Study I for definition of disability groups). A subgroup of nonhandicapped children was selected from those judged most amenable to instruction, and who had established excellent social relationships with both adults and children. It is important to note that the nonhandicapped children were clearly given options as to participation and were continually reminded that involvement was purely voluntary.

Initially, pairing of handicapped with nonhandicapped children for the peer change interventions was carried out on a random basis. However, it soon became apparent that factors such as the child's sex (and related sex role play) and other characteristics had to be considered in the pairing process. Consequently, the preschool staff assessed the potential compatibility of the children involved and pairings were based on those judgments. Since the data for this study will be presented on a case by case basis, a more complete description of the children will be found in the separate sections.

Settings

The training setting for Package I (see below) consisted of various small play areas in the preschool. These sessions were carried out in the afternoon and consisted only of the target pair or group and an experimenter. Data were recorded during the morning free play period. Package II was implemented and data recorded (see below) directly during the usual integrated morning free play period. During these times, children from all developmental levels (about 20 in each play group) select activities from the usual assortment of toys, materials, and games. Each teacher is stationed in a specific activity area and seeks to encourage productive interactions with toys and other children.

Procedure

Two training packages were developed to instruct the nonhandicapped child how to promote the development of productive social play interactions between himself or herself and the companion handicapped child. As noted, Package I was designed to be administered during the afternoon period with the hope that training in that setting would promote social growth during the morning play period. Advanced peers were instructed to apply the techniques learned in the training sessions to the free play setting. If Package I was not successful, Package II was implemented. This package consisted of direct training of the nonhandicapped child in the free play setting by the experimenter who then faded out his or her interaction. The elements and sequence of events for each package are described below.

Regardless of condition, all data were recorded during the morning free play period. Two recordings of baseline levels of performance were obtained. First, data from a period approximately two months earlier were compared to baseline data obtained just prior to the presentation of Package I. This baseline period normally lasted two to three days.

Package I. The essentials of Package I were designed to be communicated within three sessions. The general purposes of this package were: 1) to point out to the nonhandicapped child the desirability of having handicapped children involved in constructive social play, i.e., potential developmental benefits, 2) to enlist the child's assistance in improving the social play skills of the handicapped child, and 3) to train the nonhandicapped child in specific techniques to achieve that goal. Throughout the various activities of Package I, techniques involving the use of modeling, selective and contingent reinforcement, and verbal and physical prompting were presented. In addition, attention was devoted to the selection of toys most likely to involve the handicapped child, ways to adjust social play interactions to enable the handicapped child to participate more effectively, and how to handle negative behaviors when they occurred.

During session 1, a number of introductory comments were presented with respect to the first two objectives noted above. Following this, a ten-minute videotape was shown. Two separate tapes were prepared--one if the companion child was mildly handicapped and another if the companion child was severely or moderately handicapped. Both tapes were very similar and depicted three vignettes of two puppets interacting. Each vignette consisted of a different play setting with different materials: 1) sand play, 2) blocks, and 3) Fisher-Price type model toys. The puppets played the roles of the handicapped and nonhandicapped children and the various scenes provided a demonstration of basic techniques that could be used by the nonhandicapped child in prompting the social play of the handicapped companion. The principles and instructional techniques referred to above formed the essential content of the program for both tapes, although there was a greater emphasis on physical prompting and guidance (as well as the provision of more elaborate guidelines for selecting toys and adjusting the level of interactions to develop meaningful play) for the severely and moderately handicapped target children. These tapes served both as a means of conveying information in an interesting form as well as forming a basis for discussion and review of the principles and techniques that were presented.

In session 2, matters were made more concrete through role playing exercises. The experimenter, playing the role of the handicapped child, presented certain situations that required the nonhandicapped children to problem solve with respect to improving the social play interactions of the companion child. For example, one scene consisted of the following situation.

> You're at the water table; there are animals and cups in the water and towels on the shelf. Bill (handicapped child) is splashing in the water, not really playing. How can you help him to play?

The experimenter uses these exercises to elicit various techniques described earlier, to demonstrate them if necessary, and to provide feedback as to their effectiveness and appropriateness. Additional role playing exercises consisted of situations in which the nonhandicapped child took the role of the handicapped peer with the experimenter adopting the role of the nonhandicapped child. This circumstance provided an excellent framework for demonstrating certain principles as well as providing the nonhandicapped child with a unique perspective of his or her peers.

During the third session, the handicapped companion was introduced into the playroom setting. The two children were given the opportunity to engage in play with the various toys and materials. The nonhandicapped child's task was to interact in the social play context with the handicapped child and to practice the techniques that had been presented over the past two training sessions. Occasional feedback during the session was provided by the experimenter and in some instances a more active role was taken to improve social interactions. At the end of the session, the events were reviewed with the nonhandicapped child and certain key interactions were re-enacted to further underscore those techniques that were most effective.

Training sessions typically lasted 15 to 20 minutes. Since it has been demonstrated elsewhere (Guralnick, 1976; Strain, 1977) that playroom setting training sessions with experimenters present and providing guidance produce positive interactions, no data were recorded, although the experimenters' observations were noted. However, if Package I was still in effect beyond the three sessions, training sessions similar to session 3 were continued. If it was judged that Package I was not successful (based on observations during the morning play period), Package II was introduced.

Package II. Package II consisted of experimenter-directed procedures applied directly in the morning free play period to encourage social play interactions between the target pair (see Baer & Wolf, 1970). As needed, the experimenter physically or verbally prompted interactions, made suggestions, and reinforced children for playing together. This involvement was gradually faded over time. The criterion for successful fading required that proximity of participating children remain intact. Attempts at fading occurred during each session. Once fading was achieved, recording of the various behavior categories took place. Accordingly, two 4-minute periods were designated on each occasion to permit data to be collected in the absence of the experimenter.

Social play and interaction categories

Six separate measures of social play and social interaction were obtained for both members of the target pair (see Study I for a more complete description).

1) Vocal-verbal (V-V) and motor-gestural (M-G) interactions. This measure assessed the frequency of interactions between the two children. The data were recorded so as to permit an analysis of which child was interacting (giving) and to whom the interaction was directed (receiving). Similarly, recordings of V-V and M-G permitted the identification of interactions with other nonhandicapped children, both giving and receiving. These data were used to assess any generalization from the target pair to the larger group.

2) Parallel play. Using the Parten (1932) definition, the frequency of parallel play between the two children was obtained.

3) Interactions with other developmental groups. V-V and M-G interactions of the handicapped child to severe, moderate,

or mild groups as well as their interactions to other nonhandicapped children were recorded.

4) Constructiveness of play. If children were engaged in solitary, parallel, associative, or cooperative play, the constructiveness of that play was assessed in accordance with the following categories: a) inappropriate, b) appropriate--exploratory and simple play, c) appropriate--constructive, and d) appropriate--pretend.

5) Social play behavior. The Parten categories of social play were used to assess the degree of social participation during play. These categories consisted of the following descriptions of play: a) unoccupied, b) solitary, c) onlooker, d) parallel, e) associative, and f) cooperative. Two additional categories, "adult directed" and "other," completed the social play scale.

6) Teacher behavior. Four aspects of teacher behavior were assessed: a) her presence (within three feet of the target child), b) prompts to initiate or maintain social play interactions, c) positive reinforcement, and d) negative reinforcement.

Recording

For each of the categories noted above, the behavior of both target child and nonhandicapped peer was recorded. As noted, regardless of which package was in effect, recording took place in the morning free play session only.

Ratings for all categories were carried out on a time-sampling basis with a ten-second observational interval (see Study I). Five seconds were then allowed for recording the observations.

For the social play categories, the dominant activity for that ten-second interval was recorded. The same rule applied to the constructiveness of play category. For the V-V and M-G categories, all interactions and to whom they were directed occurring within the ten-second interval were noted, as were the names of the children involved in parallel play. The only restriction was that multiple instances of the same behavior directed to the same child within one interval was scored only once.

Within the 25- to 30-minute morning play period, two recordings of four minutes each (one for each member of the target pair) were obtained. The particular four-minute segments were selected on a random basis for Package I and during baseline. Accordingly, 16 intervals per child were scored for each behavior category. For Package II, recordings were obtained only after the experimenter's involvement had been gradually faded. Data for each category gathered two months prior (fall data), two or three days of baseline data, and recordings obtained during the intervention procedures constituted the three major divisions for purposes of analysis.

Reliability

Following preliminary extensive training to a criterion of 90 percent, continuous reliability checks were obtained by having two observers independently record the same child for one complete four-minute observation period at least six times per week. For the social play and constructiveness scales, reliability was calculated in terms of percentage of agreement (number agree/total observations x 100). For other categories such as V-V, M-G, and teacher behaviors, two methods for assessing reliability were employed. First, cell-by-cell comparisons for major categories between the two observers were analyzed and percent agreement calculated. In addition, agreement by total observation frequency was added. This latter method (see Study I) gave additional weight in the reliability assessment to those cells in which behaviors were actually scored. Consequently, for a particular cell, the number of scorable elements, the specific behavior, the children to whom directed, etc., were separately identified as independent observations and added to the total number of observations. A nonoccurrence of a behavior in a cell was simply scored as one observation. Reliability was calculated in terms of percent agreement.

Regardless of the method of analysis, reliability was extremely high, with a mean percent agreement of 95.9.

Results

Eleven pairs of children participated in the procedure outlined above. For the handicapped children, six were classified as mild, one as moderate, and four as severe. The results revealed that successful facilitation, even to a moderate extent, occurred only when nonhandicapped children were paired with mildly handicapped companions. The key indicator used was communication between the target pair as reflected by the motor-gestural and vocal-verbal data. For the severe and moderate children, no sustained increases in these categories were detected.

Of the six mildly handicapped children participating, changes occurred in five, although many of these changes evidenced considerable variability. Nevertheless, these case studies did reveal certain consistent interaction patterns and appear to provide a number of useful suggestions and implications for peer facilitation programs in integrated settings.

Case I

The next six figures present the interaction patterns between a nonhandicapped girl (C.A., 4-9; Peabody I.Q., 102; McCarthy GCI 82) and a mildly handicapped girl (C.A., 6-4; Peabody I.Q., 45; Zimmerman L.Q., 67). As Figure 1 indicates, there were few interactions between the handicapped child and any of the nonhandicapped children either during the fall or the more immediate baseline period. The three sessions of Package I were then administered (arrows indicate training sessions) and recordings obtained during the morning play period.

Note that the implementation of Package I produced considerably more interactions between the target pair, although some variability was evident. As for all cases that follow, no substantive changes in positive interactions to children in any of the other developmental groups were obtained. Accordingly, virtually all positive interactions of the target handicapped child involved the nonhandicapped companion.

Despite the fact that the target children interacted more frequently with one another, generalization to other nonhandicapped children was not obtained. Consequently, Package II was implemented still focusing on the particular handicapped (H)-nonhandicapped (NH) pair. Arrows under Package II indicate that experimenter intervention occurred during that session. However, although interactions between the target pair were maintained, generalization to other NH children still did not occur.

The nature of these interactions and collateral changes can be further analyzed by reference to the remaining figures. Figure 2 reveals that although these two children were frequently found to be together in parallel play during the fall and baseline periods, this interaction somewhat increased during Package I and became a dominant part of their play during Package II. Clearly, the target pair were in close proximity of one another for substantial portions of the play period. (The asterisk indicates that only 16 cells were able to be recorded during that session.) Figures 3 and 4 present the social play patterns as indicated by the Parten (1932) scale for the H and NH children respectively. No clear trends are apparent here except for the decline in adult-directed behavior of the handicapped child and some increment in associative play during Package I on the part of the nonhandicapped child. However, during Package II, the NH child engaged in a greater proportion of parallel play, apparently in an effort to promote the play of the target child. Figures 5 and 6 also indicate that the constructiveness of play did not change to any substantial degree for either child. Similarly, as noted but not illustrated, data relating to the handicapped child's interactions with other handicapped groups or teacher behavior were also stable across time.

Insert Figures 1-6 about here

Case II

Case II paired a handicapped boy (C.A., 6-5; Peabody I.Q.,59; Zimmerman L.Q., 47) and a nonhandicapped boy (C.A., 5-4; Peabody I.Q., 80; Zimmerman L.Q., 83; McCarthy GCI, 66). As indicated in Figure 7, during the fall and immediate baseline periods, the H child interacted on only a limited basis with the particular NH child, although there was a relatively low and stable rate of interaction to other nonhandicapped children. Package I brought about some overall increases, but considerable variability was apparent. The introduction of Package II produced a substantial increase in communication between the two children, especially the interactions from the nonhandicapped to the handicapped child. However, little evidence of generalization to other nonhandicapped groups was observed.

Figure 8 illustrates that Package II produced a substantial increment in parallel play between the two boys. Moreover, Figure 9 reveals that increases in associative play corresponded to the introduction of Package II for the handicapped child. Since M-G and V-V behaviors of the handicapped child were generally directed to only the target nonhandicapped child, associative play appeared to be limited to that companion child alone. Interestingly, the NH child showed a dramatic increase in associative play although the H child was included to only a limited degree in these activities. No consistent changes in the constructiveness of play for either child (see Figures 11 and 12) were noted. Finally, none of the other behavior categories revealed any correspondence to the intervention programs.

Insert Figures 7-12 about here

Case III

The next two cases provide examples of variations on the basic procedure. In this instance, after Package I had produced only a small effect, Packages I and II were introduced simultaneously. That is, while the experimenter prompted and reinforced interactions during the morning play period (Package II), afternoon training sessions were also conducted. Also during Package II, a second nonhandicapped child was introduced with the original child dropping out four recording sessions later.

A handicapped girl (C.A., 5-10; Peabody I.Q., 34; Zimmerman L.Q., 66) was paired first with a nonhandicapped girl (C.A., 5-8;

Peabody I.Q., 97; McCarthy GCI, 98). The second nonhandicapped child, also female, had a C.A. of 5-1 (Peabody I.Q., 91; McCarthy GCI, 90). As indicated in Figure 13, the fall and baseline data revealed only the occurrence of interactions of the handicapped child with other nonhandicapped children and no interactions whatsoever with the nonhandicapped companion children. The introduction of Package I initially produced some marked changes, but these were not sustained. It was then decided to implement Packages I and II concurrently as well as introduce a second child. However, as the figure indicates, this had absolutely no effect. When the original child dropped out (see large arrow) we did obtain a substantial positive change between the target pair, but once again, generalization to other nonhandicapped children did not occur.

As in the previous cases, parallel play between the target children increased considerably (see Figure 14). No other consistent patterns were evident in the other behavior categories for any of the children with the important exception of substantial increases in the associative play of the handicapped child (see Figure 15).

Insert Figures 13-15 about here

Case IV

The handicapped child selected for Case IV was a mildly handicapped girl who generally resisted all attempts to engage in play or even interact with any of the other children (C.A., 6-1; Peabody I.Q., 40; Zimmerman L.Q., 8[illegible]). This case also provided an example of a variation in the basic procedures through the introduction at one point of a group of four to five nonhandicapped children to encourage social play interactions. The primary nonhandicapped child involved was a 4-year, 11-month-old girl (Peabody L.Q., 103; Zimmerman L.Q., 107; McCarthy GCI, 99).

Figure 16 illustrates the course of events. As usual, fall and baseline data revealed few interactions between the nonhandicapped children and the target handicapped child. The introduction of Package I produced some positive changes but these were highly variable. Package II was then introduced in isolation but Package I was added almost immediately. Note that with Package II, no data were recorded since the experimenter was not able to remove herself from the interactions. Consequently, Package II was terminated and a procedure which included group training (three models) was introduced for Package I. Some progress was made with this procedure but when a fourth child was introduced into the group, a substantial change developed. As Figure 16 indicates, a large number of mutual interactions were obtained. Please note that the data are based on responses from or to any of the nonhandicapped children. Consequently, a greater opportunity for interactions is available with the group procedure, although the lack of generalization to other nonhandicapped children is perhaps due, in part, to the fewer nonhandicapped children available apart from the group.

Nevertheless, these results appear to represent important interaction changes, especially when contrasted to the fall and baseline data. The social and play skills of the nonhandicapped group during this procedure were monitored and did not reveal any systematic effects as a result of their participation in the facilitation process. For the handicapped child, Figure 17 indicates that solitary play was dramatically reduced, with parallel and some associative play becoming more frequent. No other consistent changes in the other measures were obtained.

Insert Figures 16 and 17 about here

Case V

The handicapped child involved in this final case, although functioning quite high on many developmental tests (C.A., 4-9; Peabody I.Q., 70; Zimmerman L.Q., 51; McCarthy GCI, 82), exhibited a wide range of inappropriate emotional and social behaviors and a number of psychological reports considered him to be seriously disturbed. The nonhandicapped companion child (C.A., 4-5; Peabody I.Q., 100; Zimmerman L.Q., 107; McCarthy GCI, 102) was very willing to help even though the handicapped child provided more negative comments to the group than any other child.

Figure 18 illustrates the pattern of change in M-G and V-V interactions. Fall and baseline data indicated some tendency to interact which increased with the introduction of Package I. At the later stages of Package I, these two children appeared to be interacting with each other for almost the complete play period, although once again, generalization to other nonhandicapped children did not occur.

Although there were still some negatives, the substantial increase in positive interactions considerably outweighed these negative interactions. In addition, the constructiveness of play tended to increase slightly for the handicapped child while most of the social and play interaction categories remained unchanged for the nonhandicapped companion child. However, the most noteworthy change that corresponded with Package I was the substantial increase in the handicapped child's associative play (see Figure 19).

Insert Figures 18 and 19 about here

Discussion

The results of this series of case studies revealed a number of consistent patterns and provided some important suggestive evidence. Most apparent was the fact that children classified as severely and moderately handicapped derived no detectable benefit in the free-play setting as a result of their interactions with nonhandicapped children. Package I never produced any sustained effects and the experimenters' presence was continually required to achieve even a modest degree of interaction during Package II. This proved to be a considerable strain for all involved, and Package II was normally terminated after only a few sessions.

This state of affairs contrasts with informal observations of the interactions obtained during the afternoon training sessions for Package I. For the most part, especially during the earlier sessions, the nonhandicapped children were helpful, active, and interactive. Ultimately, however, the overall lack of responsiveness of the handicapped child apparently served to weaken their enthusiasm, despite encouragement and reinforcement for interaction by the experimenters.

The effects for children classified as mildly handicapped were considerably different. Overall, the outcomes of facilitation by nonhandicapped peers were positive, with increases in the frequency of positive interactions among peers being the most prominent effect. Other changes such as modest increases in associative play and reductions in solitary play and teacher-directed behavior occurred at various points as well. Nevertheless, the variability in the data and the introduction of different procedures (i.e., Packages I and II and their variations) prevents more definitive comments, especially with regard to the relative effects of the intervention packages.

Depsite these shortcomings, a number of consistent patterns did emerge, even for the mildly handicapped children. On the positive side, the procedures served to encourage target children to play in proximity of one another as measured by parallel play, thereby providing opportunities for observational learning. In fact, in some instances, the children spent large segments of the play period near one another. In addition, it is important to note that the measurement of the nonhandicapped child's level of social play interactions and constructiveness of play revealed that the involvement in the program did not reduce the quality or constructiveness of the child's play.

On the negative side, it was observed that even when positive changes did result, no generalization of these interactions to other nonhandicapped children were evident, nor for that matter to any other children from any developmental group. The major reason Package II was implemented was due to the failure of Package I (even when it worked for the target children) to produce a generalized impact. This outcome is particularly distressing since, after all, the true measure of a program's effectiveness is the extent to which durable and generalizeable changes occur. In fact, the rationale for the selection of peers as agents of change was to increase the likelihood of generalized peer interactions.

With regard to this lack of generalization, a number of explanations can be advanced. It is possible that extending the number of sessions of Package II would have produced a more successful outcome. However, since no trends were noted even when Package II was extensively applied, this does not appear to be a plausible explanation. Alternatively, it is possible that the untrained peers, especially those who were nonhandicapped, did not reinforce the interactions by the target handicapped child, thereby limiting the extent of generalization. Strain (1977) suggested this explanation to account for the reduction of interactions in his study. However, two arguments are not consistent with this interpretation. First, in the integrated preschool, continuous teacher efforts were designed to encourage positive interactions among all children, including the target children. Second, and perhaps most persuasive, are the data indicating that the target handicapped children rarely initiated interactions with any of the NH children (see H to other NH) at any point. Unless extinction was very rapid, this explanation is unlikely.

Finally, we might consider the possibility that the nonhandicapped peers were not effective tutors, i.e., Packages I and II did not transmit the necessary skills and information. Since no direct data were collected that relate to this issue we cannot eliminate this possibility although anecdotal observations and earlier work suggest that this was not a major factor.

What then accounts for the fact that advanced peers were unable to bring the handicapped children into the reinforcing community of peers (Baer & Wolf, 1970)? It seems reasonable to suggest that despite increased levels of positive social interaction with the companion advanced children, the social repertoire of the handicapped child remained unchanged. The training programs for Packages I and II emphasized the role of the nonhandicapped peers as elicitors and supporters of social interactions. As a result of the play interactions being carried by the nonhandicapped child, little in the way of social approach or interpersonal skill development were systematically communicated, and modeling of these skills by the nonhandicapped children appeared insufficient to produce change. To the extent that these skills (i.e., entry level skills) are necessary to achieve productive interactions, we can more adequately understand why generalization of these interactions to other children did not occur.

The limited generalization to other children appears to be related to the lack of substantial changes in a variety of collateral behaviors. As noted above, virtually all previous studies in this field have focused on the frequency of social interactions. Although these behaviors often correlate with sustained, meaningful, and constructive social play and participation, they can also occur in the absence of any of these other more complex changes. In fact, this is precisely what was found here. Specifically, the quality of social participation and constructiveness of the handicapped child's play was not affected by the intervention program to any substantial degree.

The absence of generalized outcomes across settings, children, and response classes suggests that selective reinforcement and encouragement by advanced peers may facilitate social play interactions up to a point, but the skills do not appear sufficient to permit them to be "trapped" by the community of peers. These findings contrast with those of others, (e.g., Baer & Wolf, 1970; O'Connor, 1972) who suggest that for many isolate children, a positive generalized impact can occur. However, children in these studies had a fairly complex repertoire of skills (with no other major deficits) and the educational treatment may have simply "enabled" these skills to become manifest.

Accordingly, it may well be that successful intervention programs for children with more extensive deficits may need to identify the repertoire of social play and interaction skills to be trained in a directive manner. A necessary aspect of this process is the identification of the relevant entry level skills. Little empirical data has been gathered on this topic but the "interactive" nature of these skills is most apparent. For example, Mueller et al., (1977) describes the development of "turn rhythmicity" and a number of other investigators have also pointed out the significance of reciprocal communication (Ervin-Tripp & Mitchell-Kernan, 1977; Lewis & Rosenblum, 1977). In addition, the direct instruction of "friend-making" sequences including greetings, asking and giving information, etc., described by Gottman, Gonso, and Schuler (1976), appear to be skills essential to enable children to benefit from interactions with the peer community. A major research question for the future is the role peers can play, in conjunction with adults, in the development of these skills.

Finally, it may be helpful to introduce the concept of tutoring as a means of understanding some of the results of this

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work. In particular, it is important to ask why it was more difficult, even in some instances when the nonhandicapped child was paired with a mildly handicapped child, to consistently enlist the aid of the advanced peer to adopt the tutor role in the free play setting. This occurred despite the positive values that are associated with a tutor's position (see Allen, 1976). We can speculate that the perceived status derived from adopting the teacher role and the increased adult attention that results are more apparent in the playroom setting, thereby improving the success of those sessions. In the free play setting, however, the attractiveness of the tutor's role is seriously undermined since the teachers do not normally play an obvious instructional role in the free play setting and adult attention is distributed widely. This factor, combined with competition for attention from other peers, may well have been sufficient to reduce the effectiveness of the peer change program in the free play setting.

Summary and Conclusions

Taken together, the results of these case studies suggest that we need to seek a variety of alternative programmatic strategies in integrated settings and to reconsider the potential benefits that can result from direct facilitation by nonhandicapped peers. In doing so, it is important that we maintain our awareness of the powerful roles peers play in virtually all aspects of the socialization process, while simultaneously recognizing certain limiting factors that exist in this regard for children at widely different developmental levels (see Hartup, 1978).

For severely and moderately handicapped children, it is clearly not feasible for nonhandicapped peers to carry a major instructional role in the area of social play development in the absence of considerable direct teacher involvement. In retrospect, this is perhaps not surprising, since a substantial number of studies have not succeeded with this or a similar strategy when the handicapped children had limited skills (Strain et al., 1977; Strain, 1977).

The question remains as to what roles, if any, can nonhandicapped peers play in the development of severely and multiply handicapped classmates? The initial success of interactions in the playroom setting suggests that a more systematic study of these interactions could prove valuable. It would be important to determine if the social play behaviors of the handicapped children do in fact change in this more restricted setting and if they are maintained. The particular instructional processes that are associated with these changes and their training and development would also be of interest.

It is quite possible that social play development can be facilitated in this setting for these children and that social development here represents an independent positive contribution to the handicapped child's development. Additional efforts could then be addressed to expanding the settings in which these interactions take place.

For mildly handicapped children, it is suggested that, despite the need for considerable revision, direct instructional interactions in free play settings by nonhandicapped children appears to be both feasible and potentially valuable. Two major modifications appear in order, however. First, rather than individualized "tutoring" by a nonhandicapped child, groups of nonhandicapped or advanced peers should be utilized. Additional training should be directed toward inclusion of the handicapped child into the group activities. Beyond the fact that responsibilities are shared, a major benefit here is that a particular nonhandicapped child will be able to interact with the handicapped child, yet remain within his or her group (with the group serving as the key source of social reinforcement). The second recommendation, in response to the limited degree of generalization to other peers and response classes, is that greater emphasis be placed on the instruction of social approach and social interaction skills. The extent to which this can be carried out by nonhandicapped peers or requires direct teacher involvement is a question for future research. It is possible that by incorporating these two changes into the training strategy that more positive results will occur.

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Fig. 1

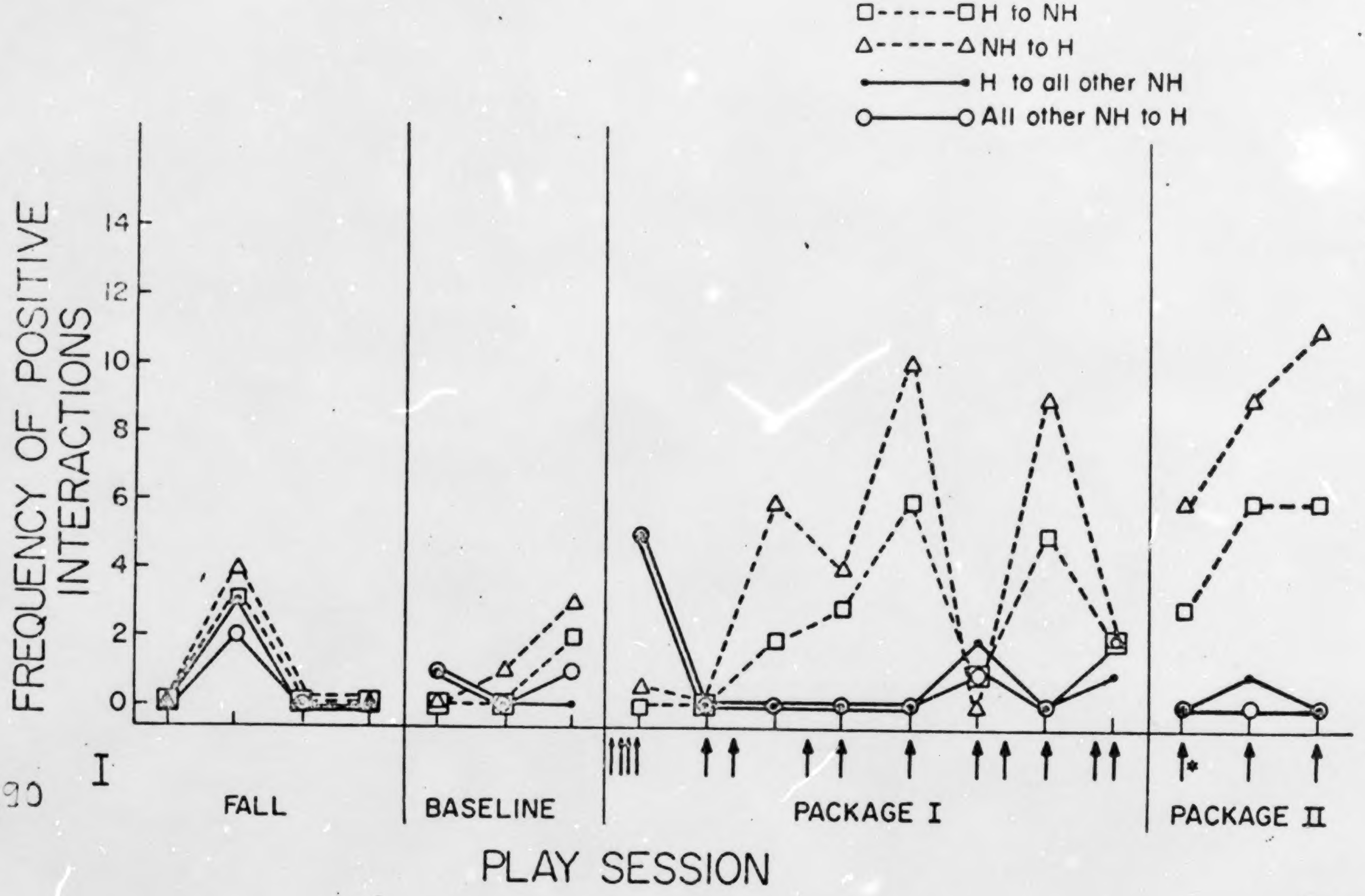
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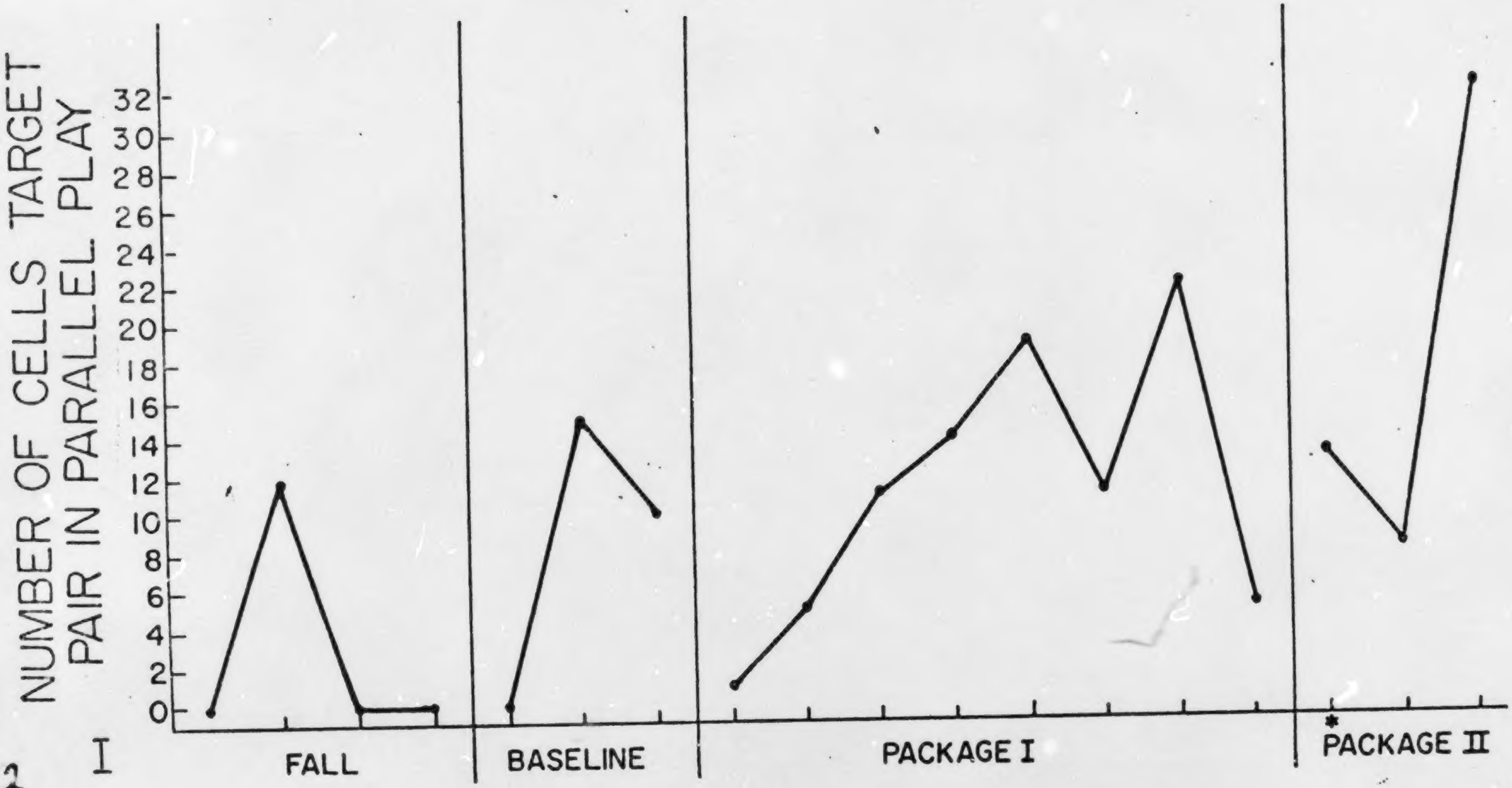
Fig. 2



PLAY SESSIONS

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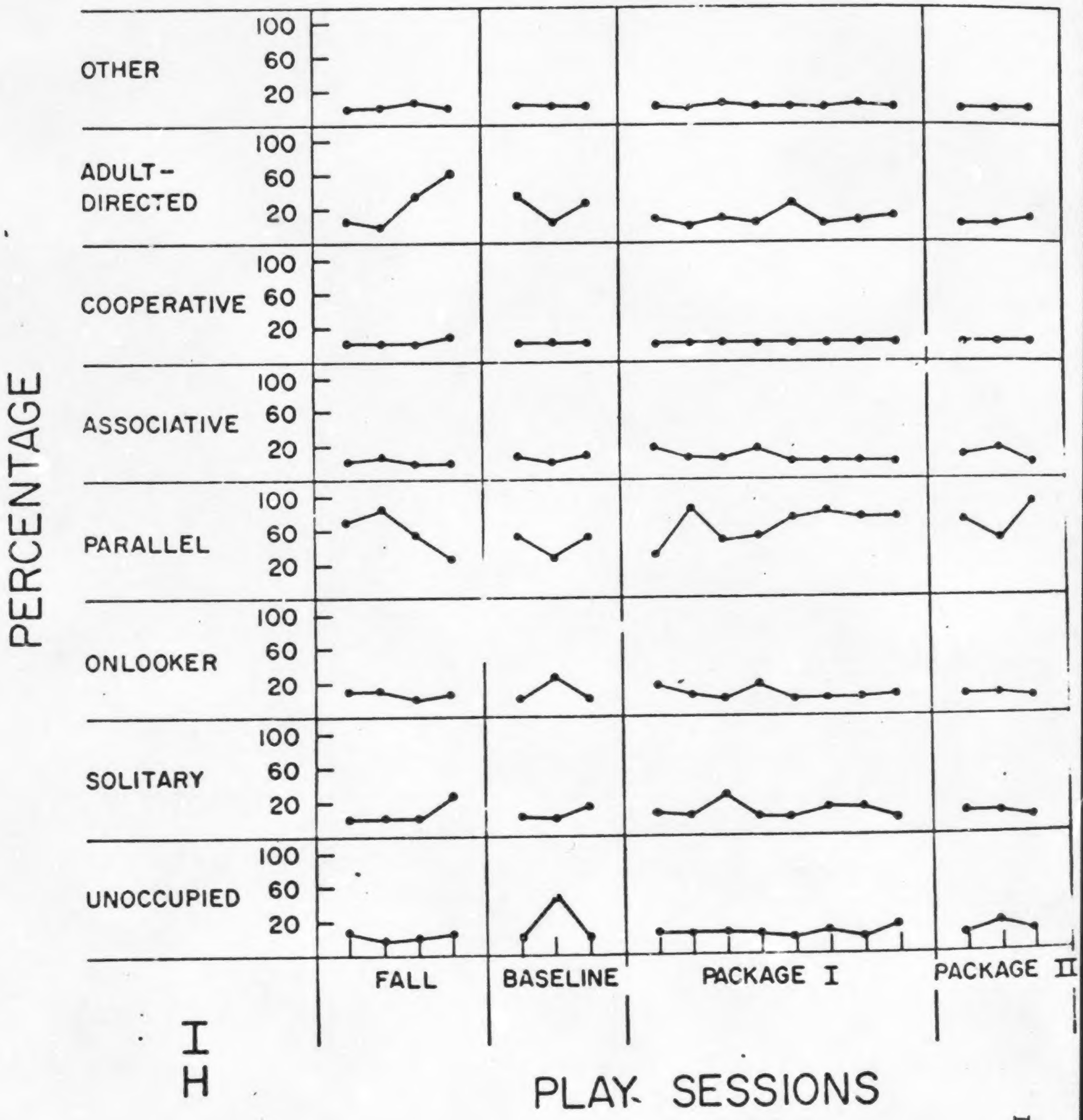
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Fig. 3

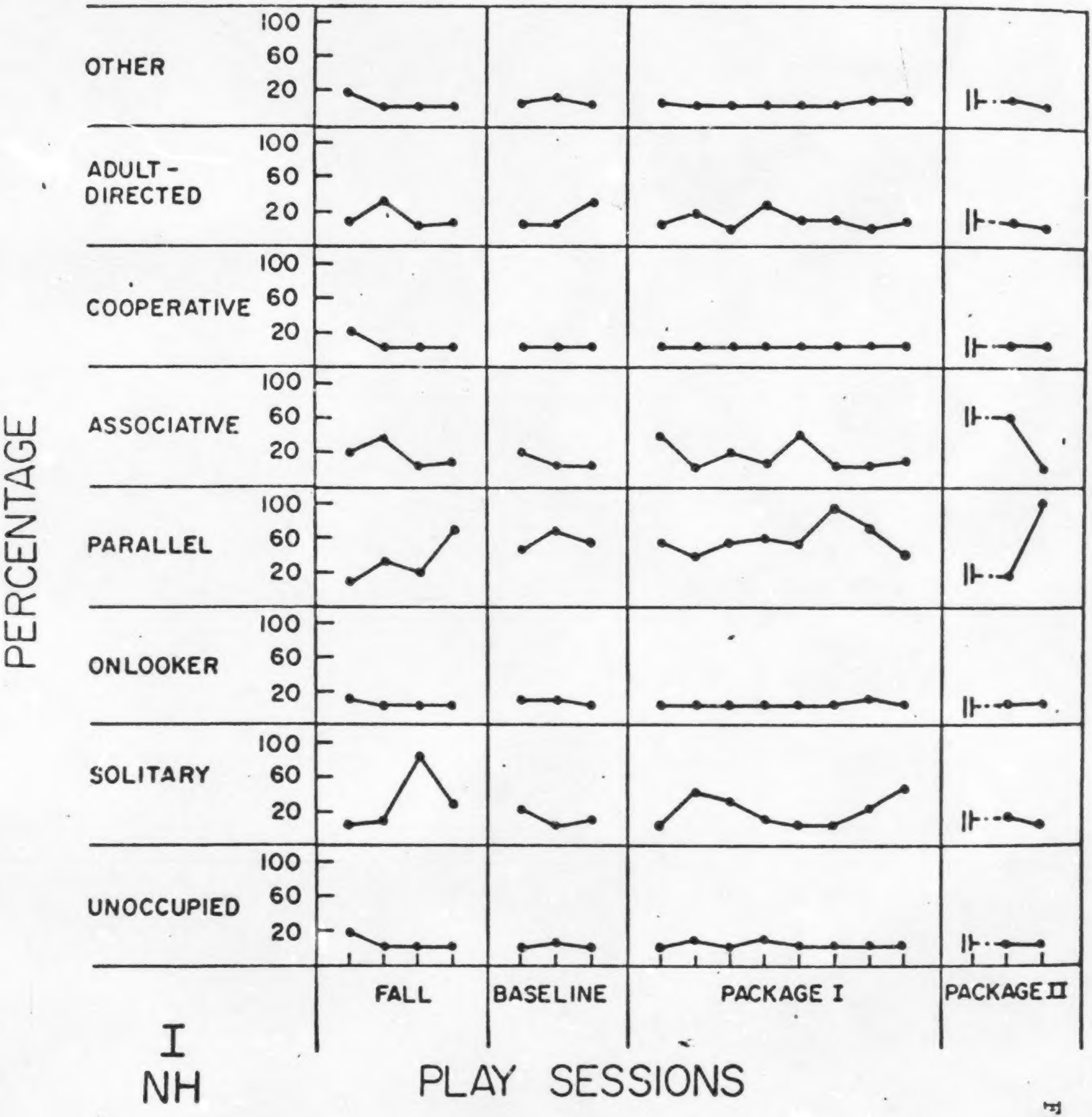
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Fig. 4

Fig. 5

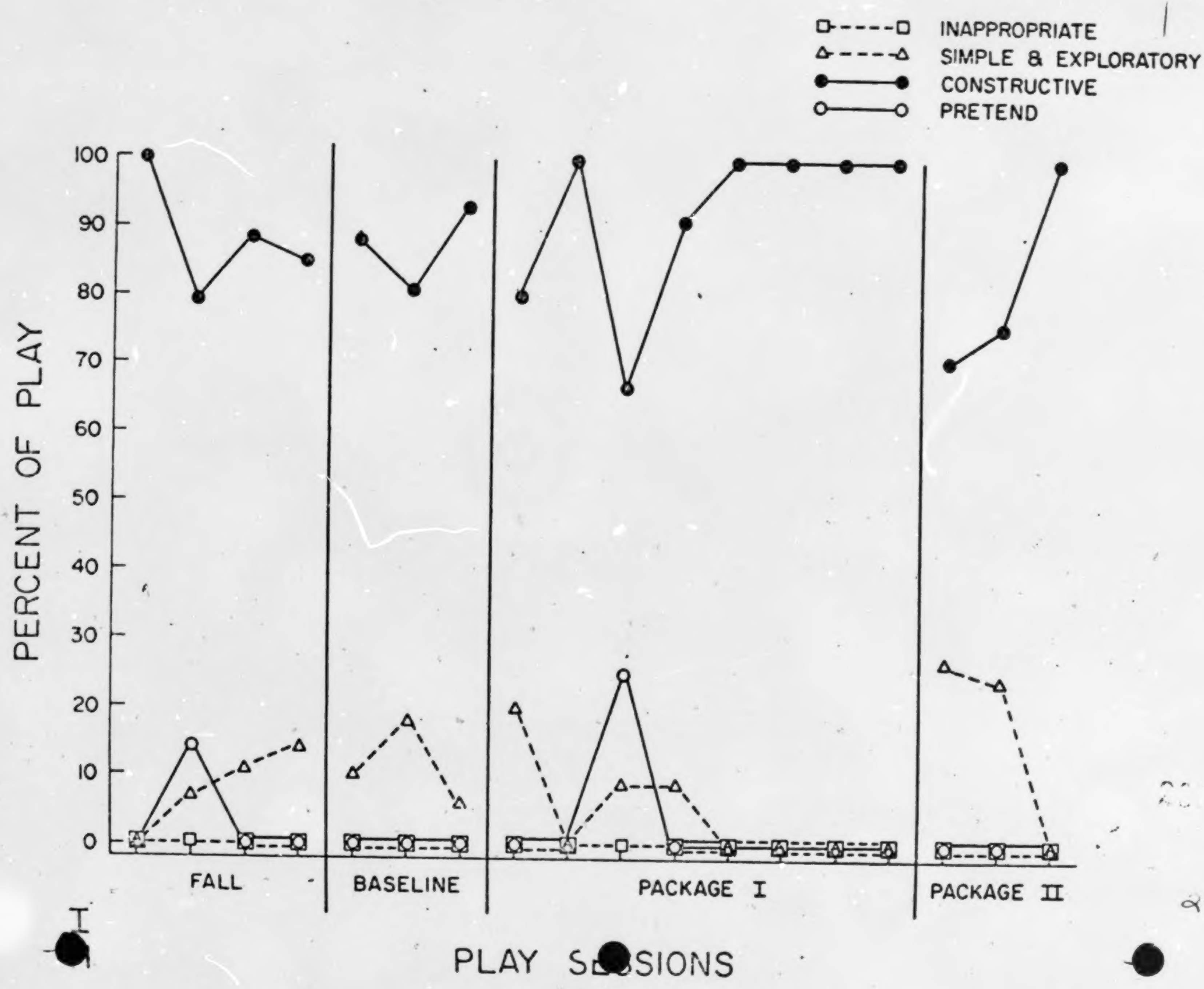
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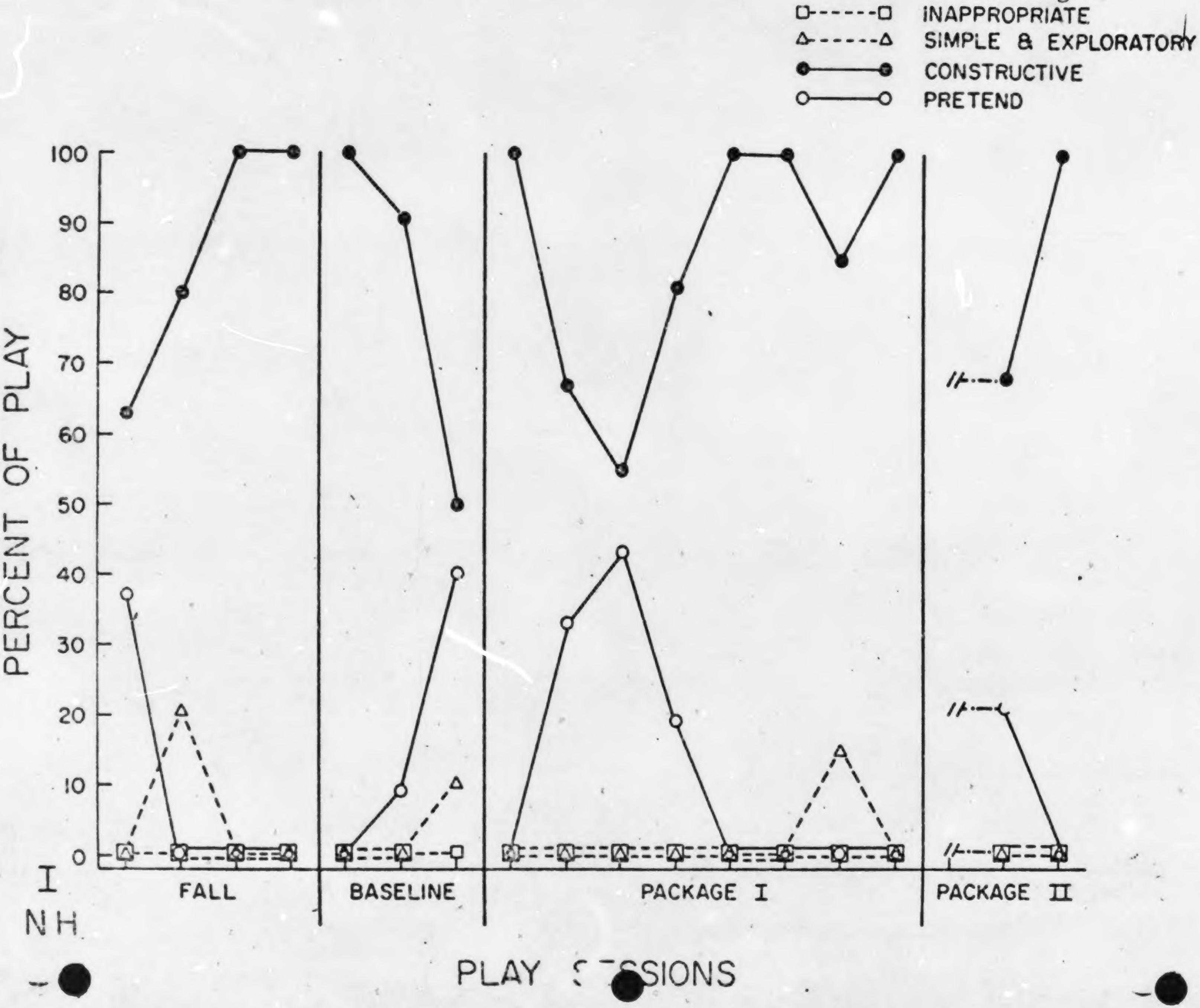
Fig . 6



INAPPROPRIATE
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PERCENT OF PLAY
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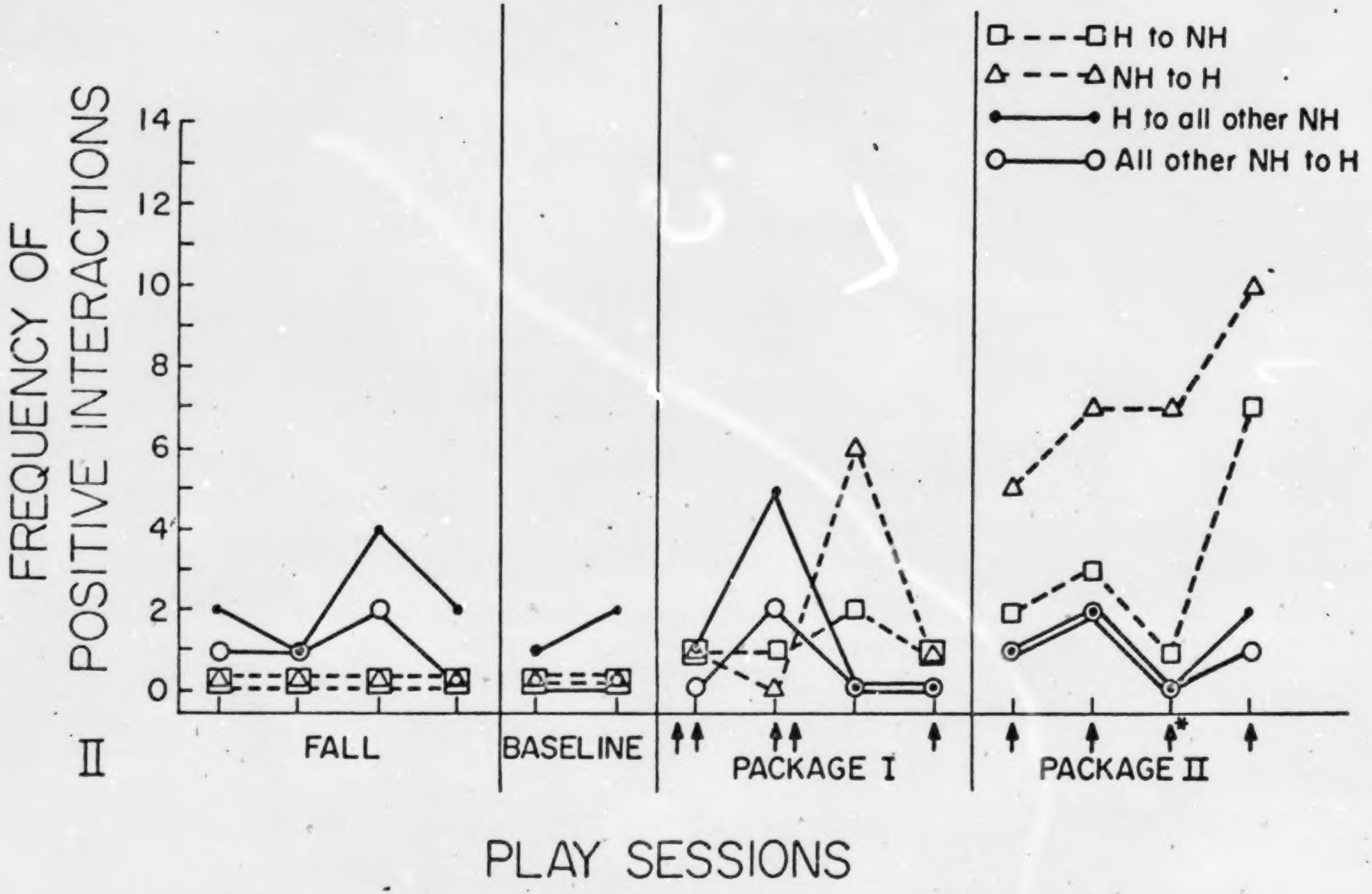
Fig. 7



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FREQUENCY OF POSITIVE INTERACTIONS
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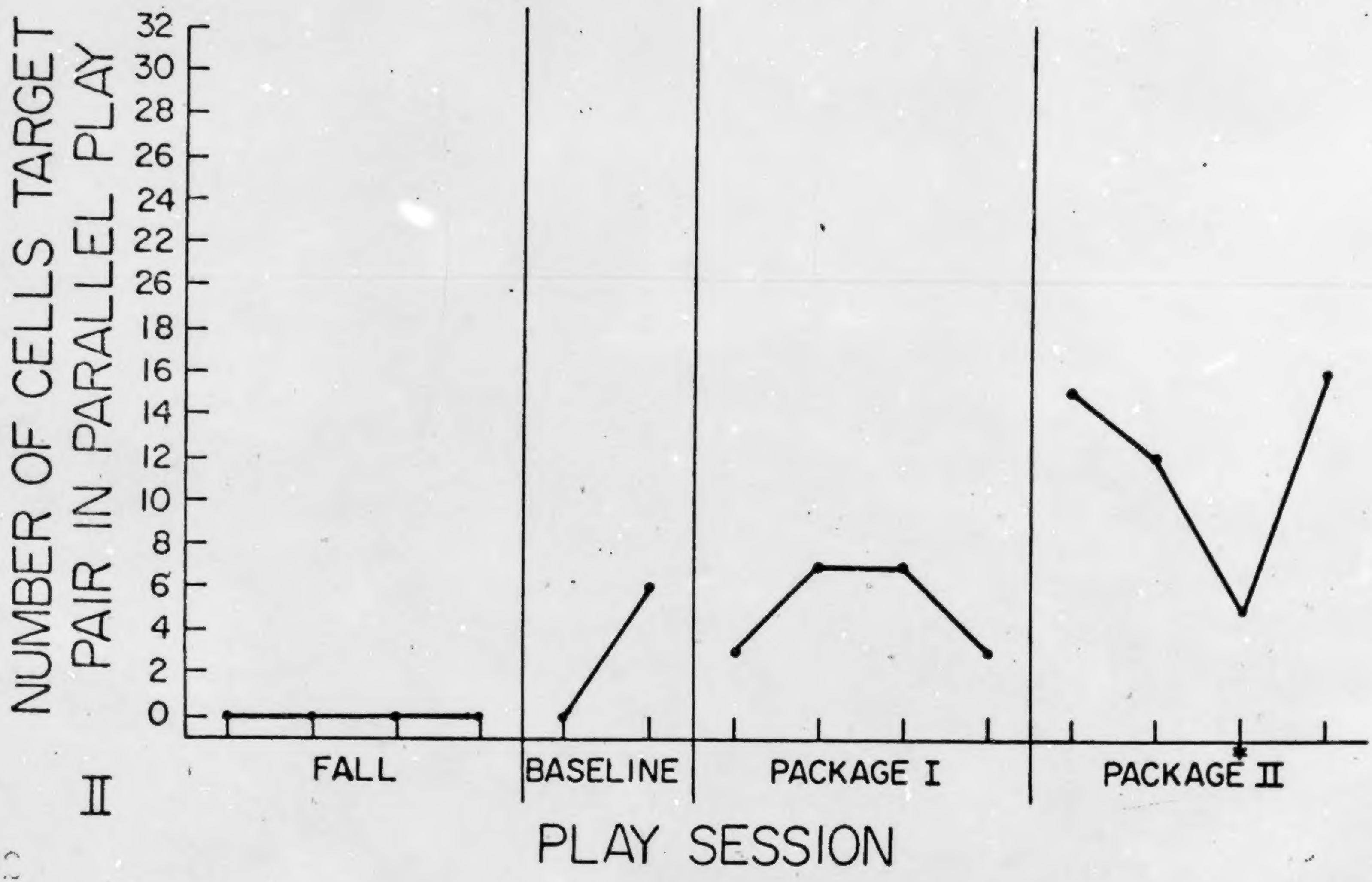
PLAY SESSIONS

Fig. 8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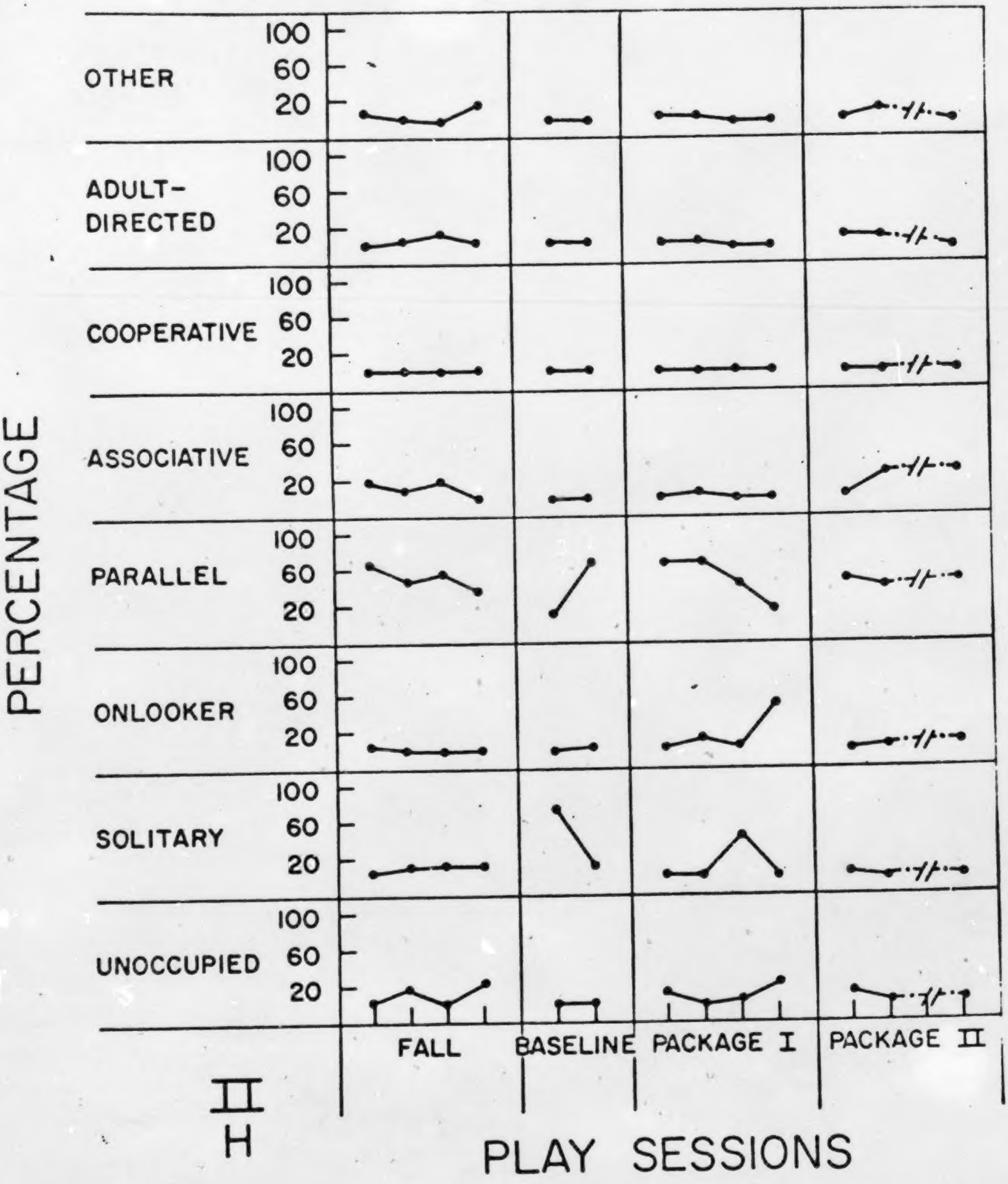
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Fig. 9

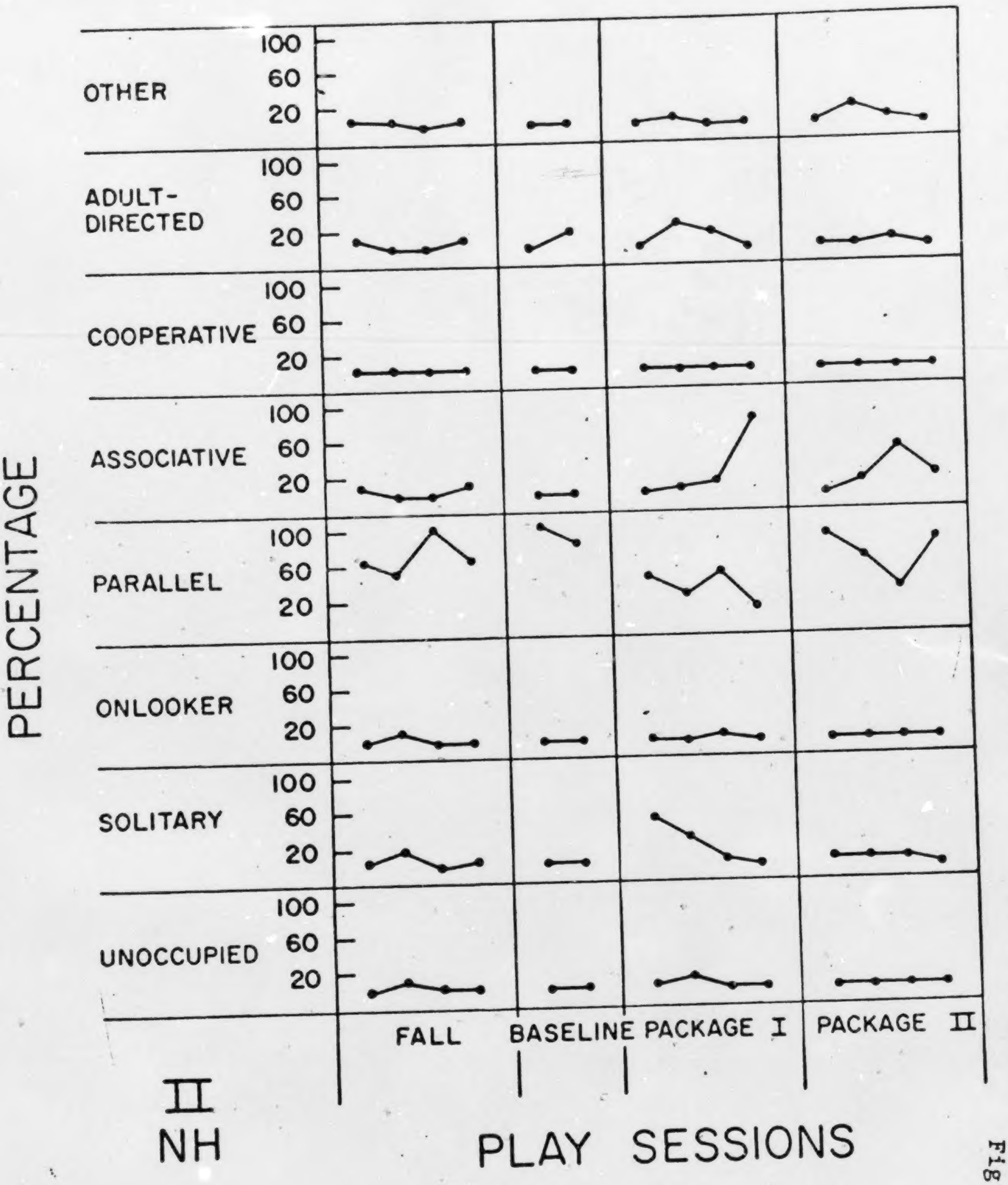
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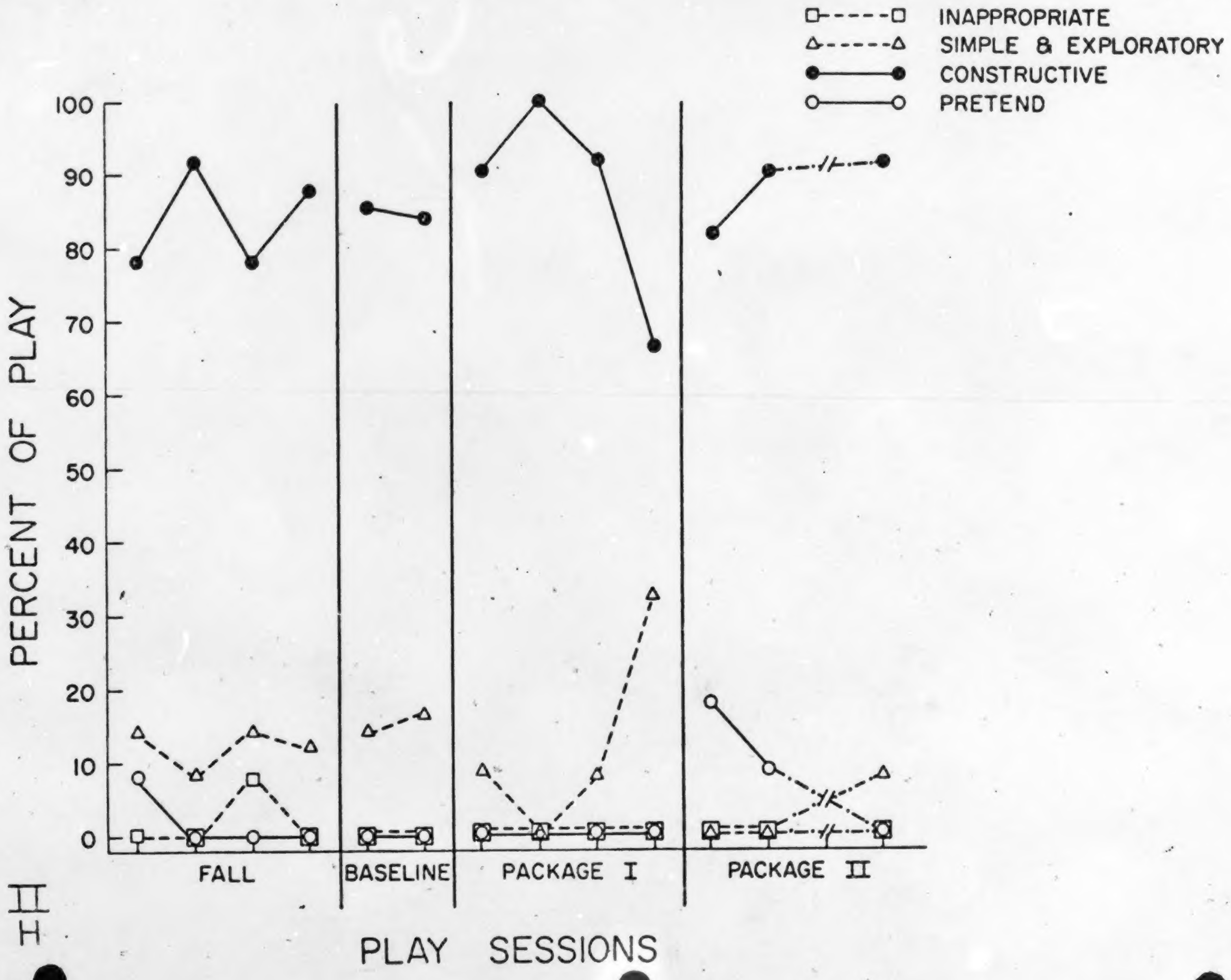
Fig. 10

Fig. 11



INAPPROPRIATE
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Fig. 12

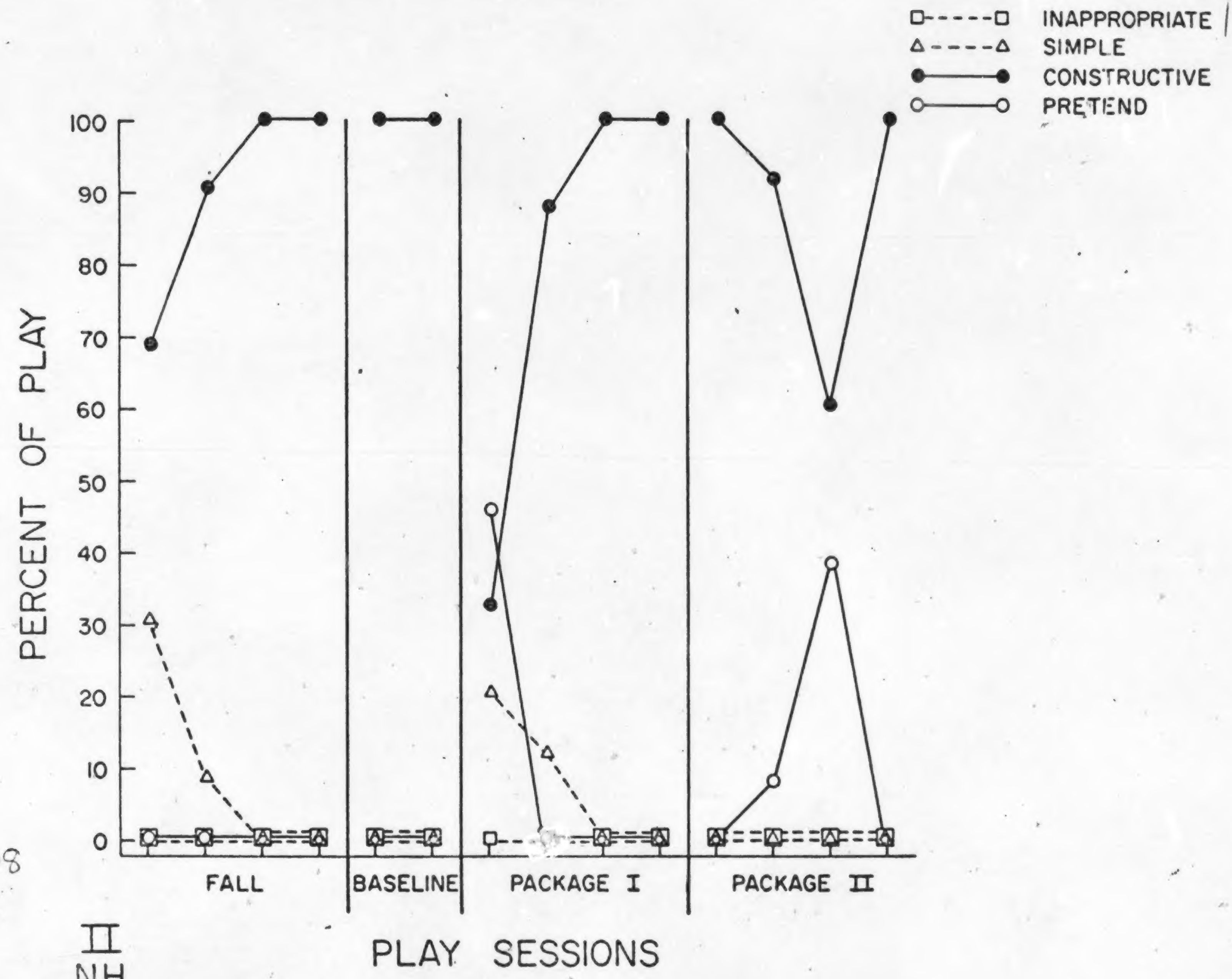

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Fig. 13

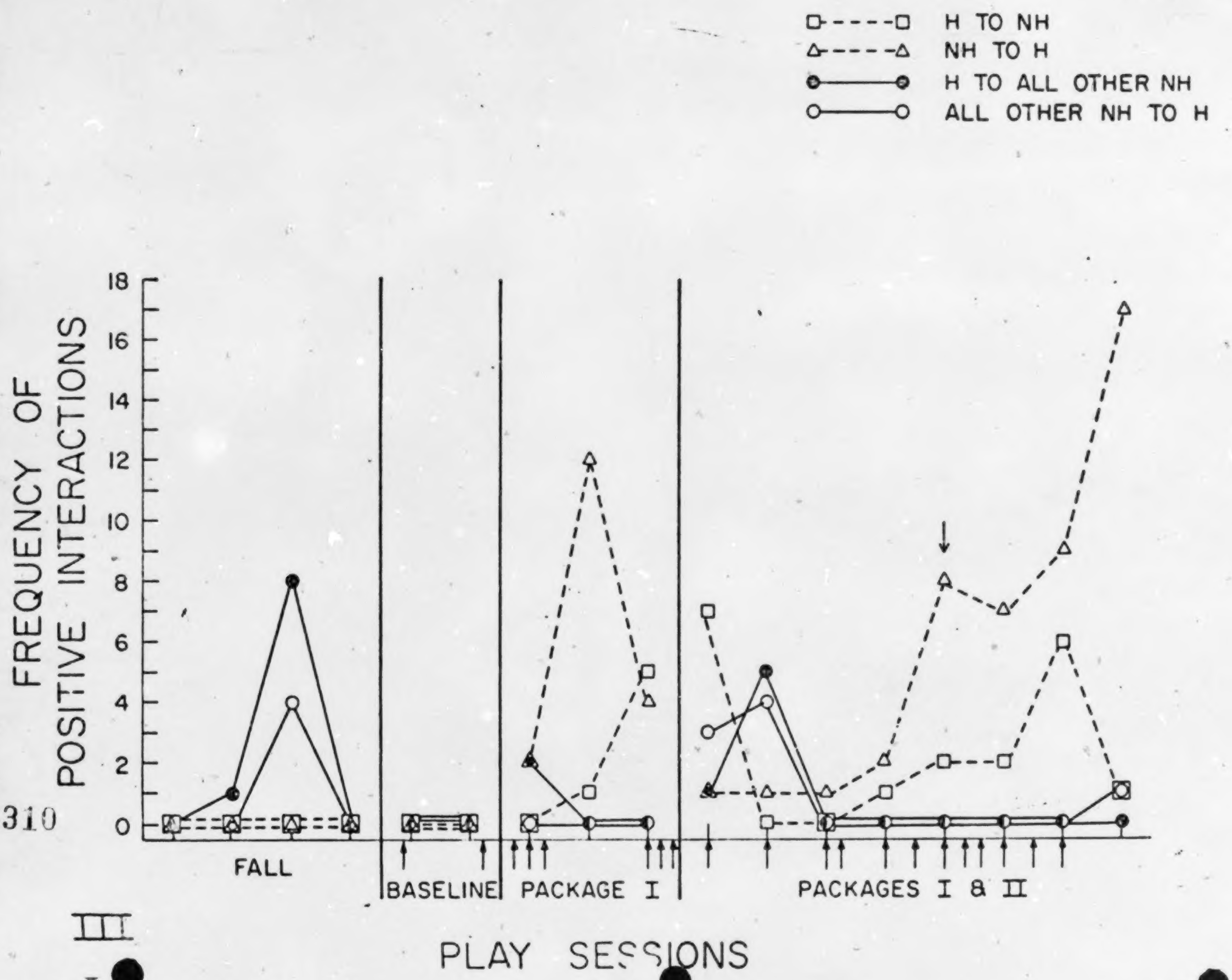

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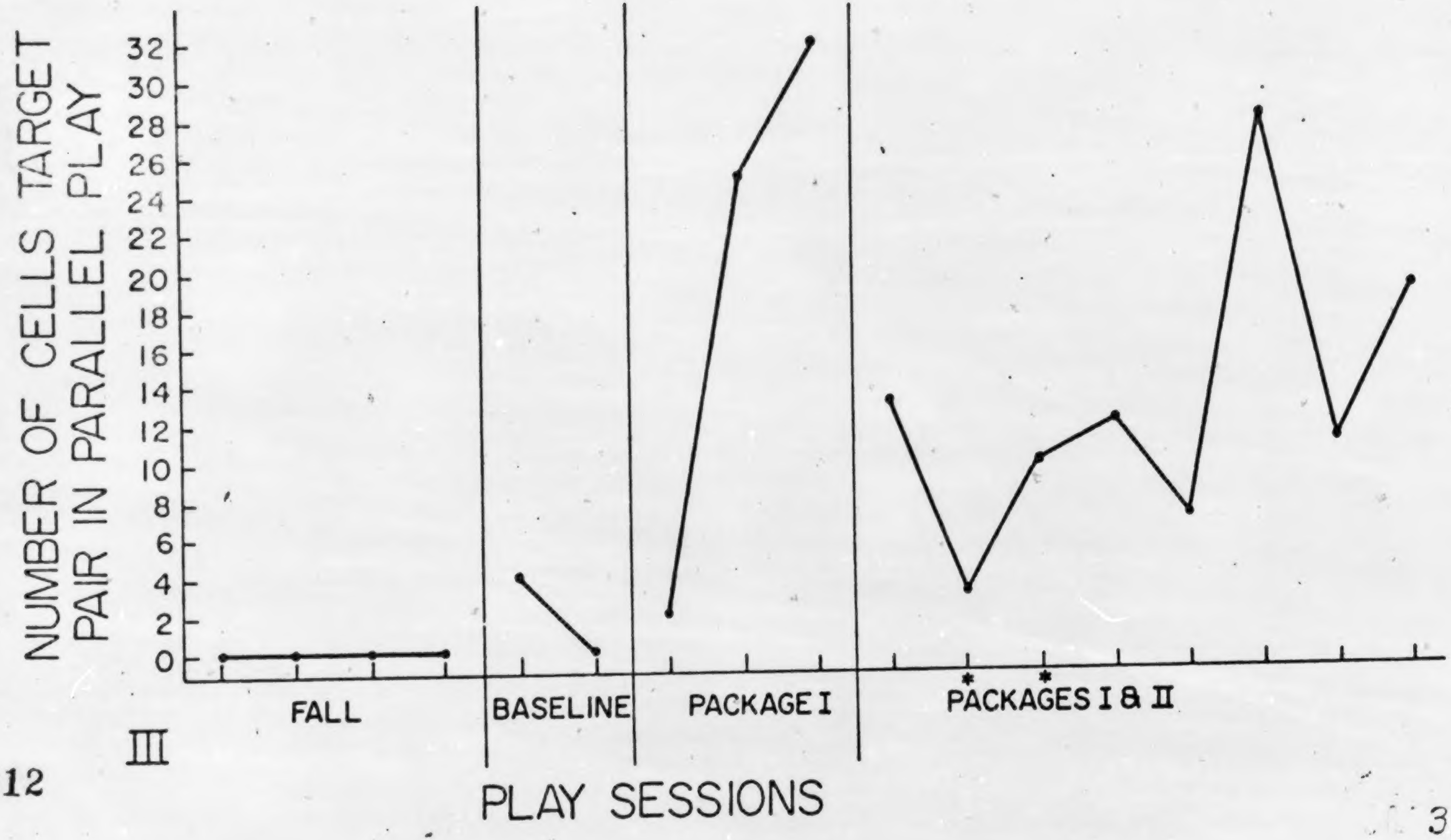
Fig. 14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PLAY SESSIONS

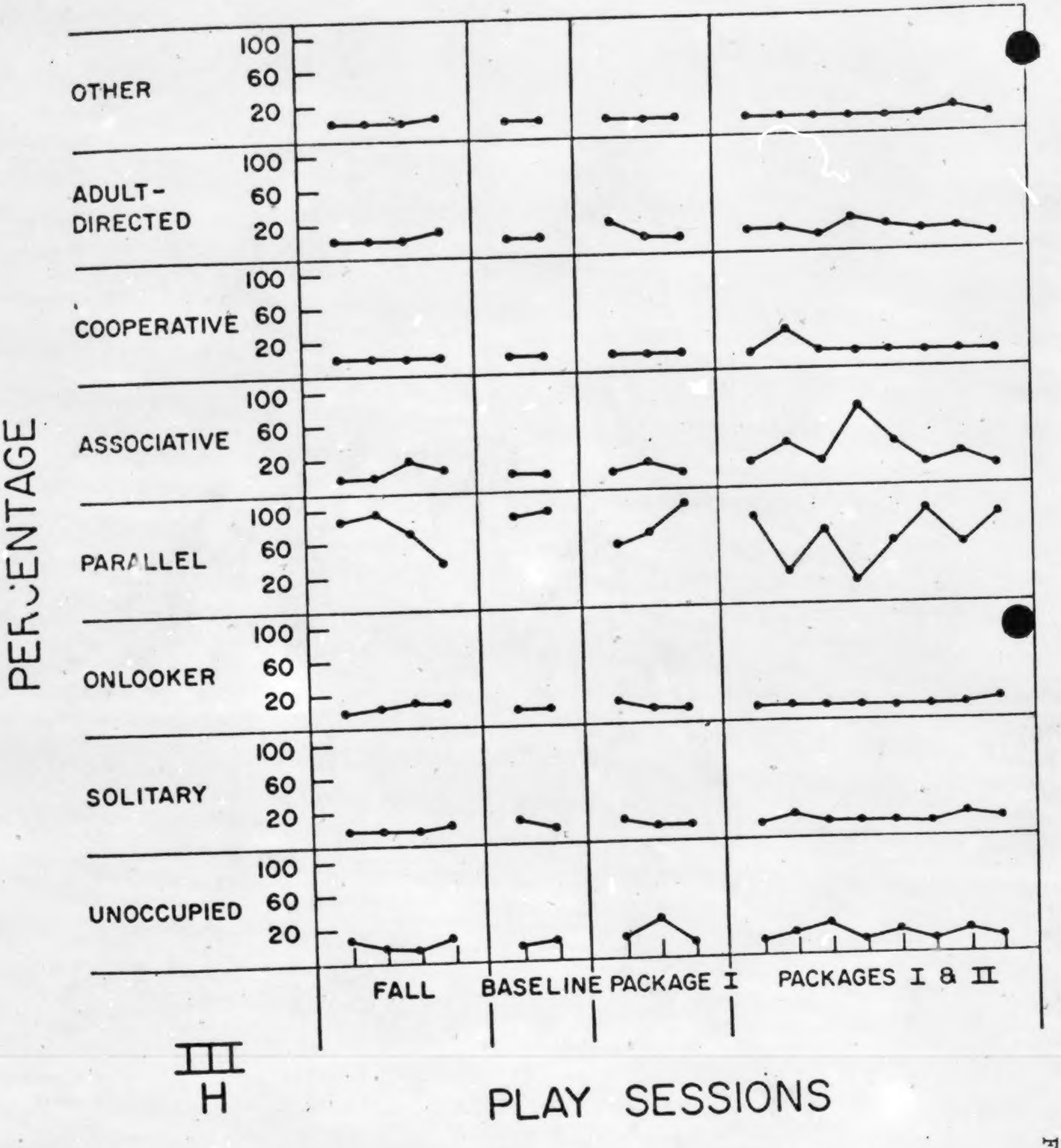
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Fig. 15

Fig. 16

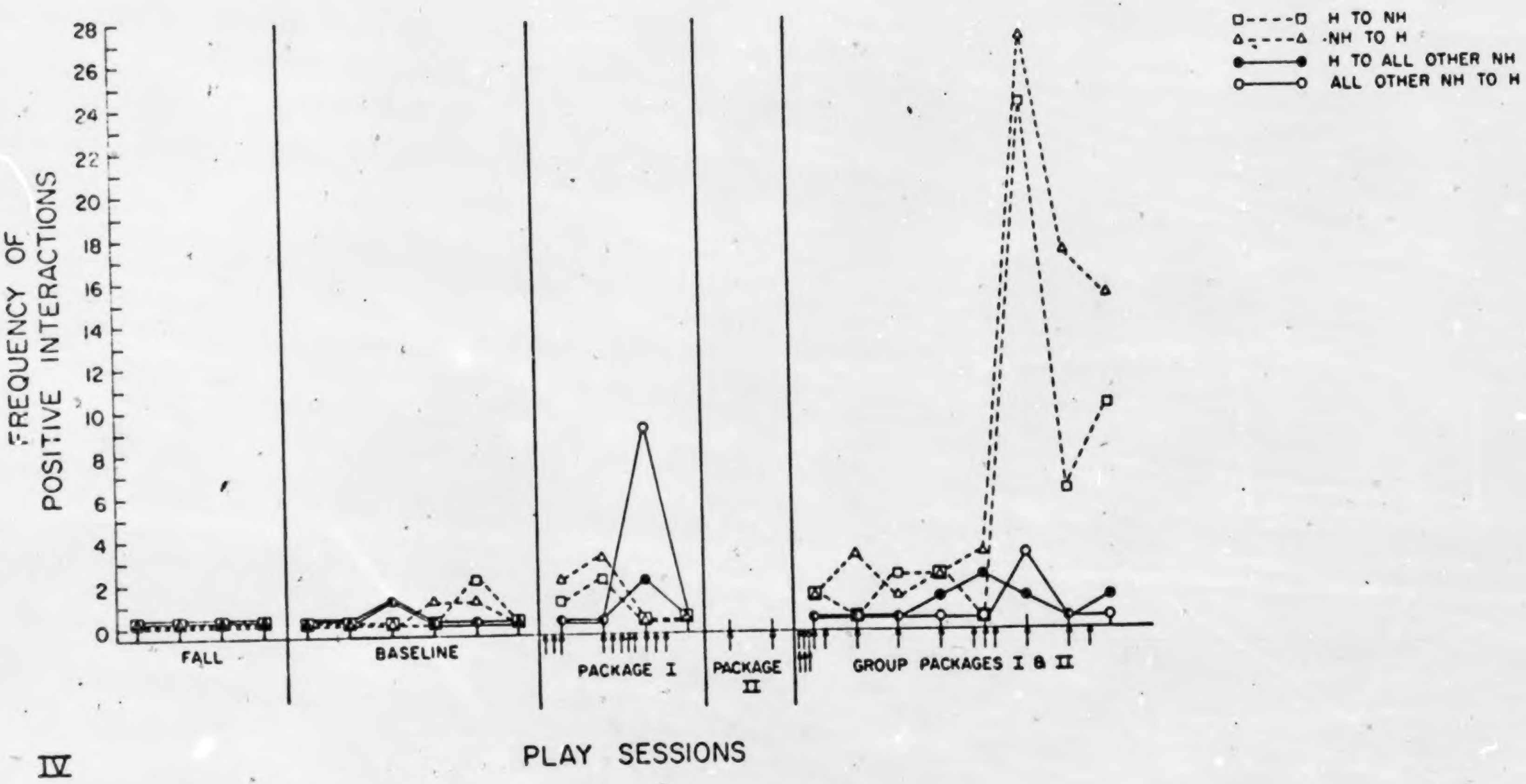

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Fig. 17

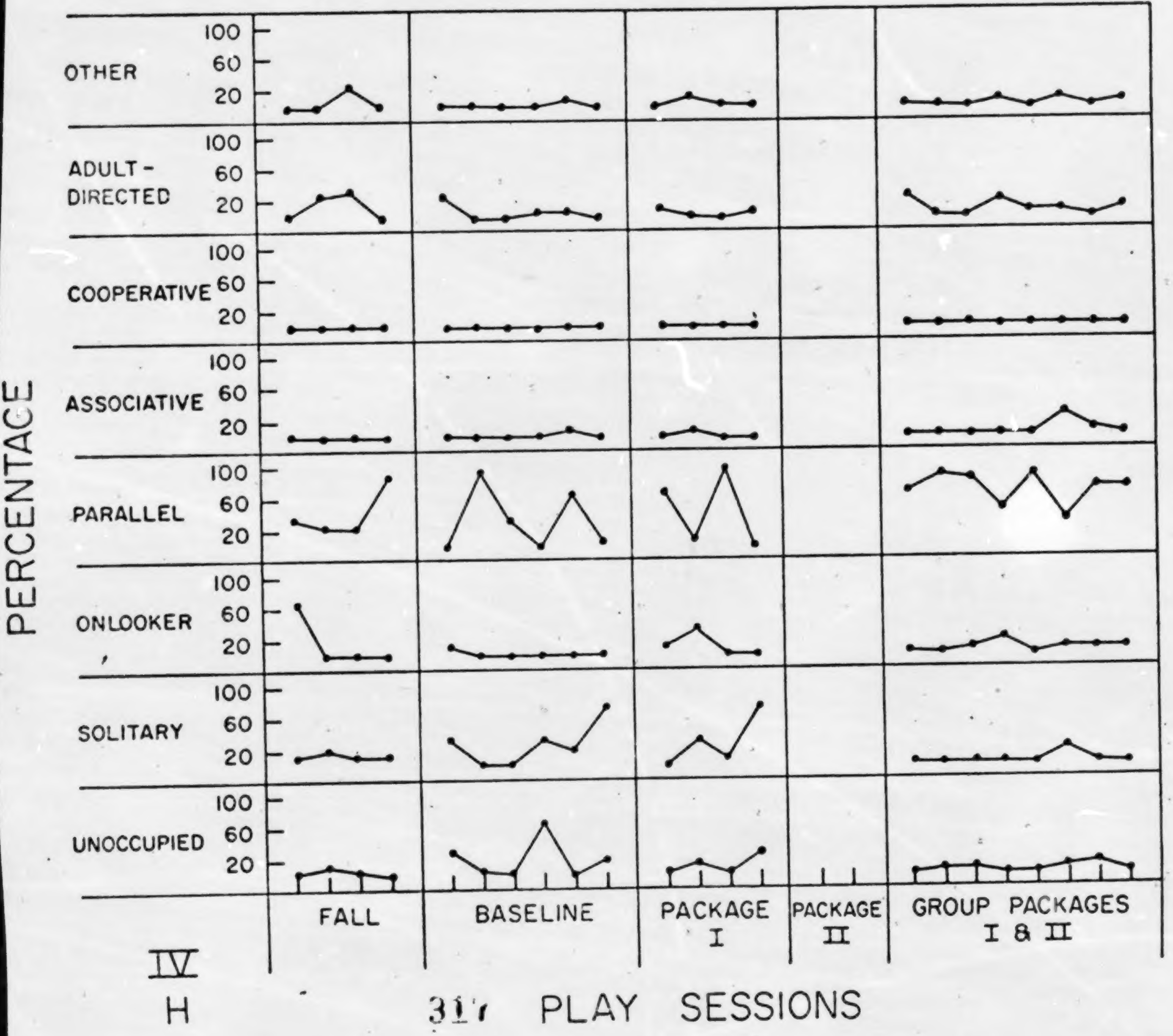
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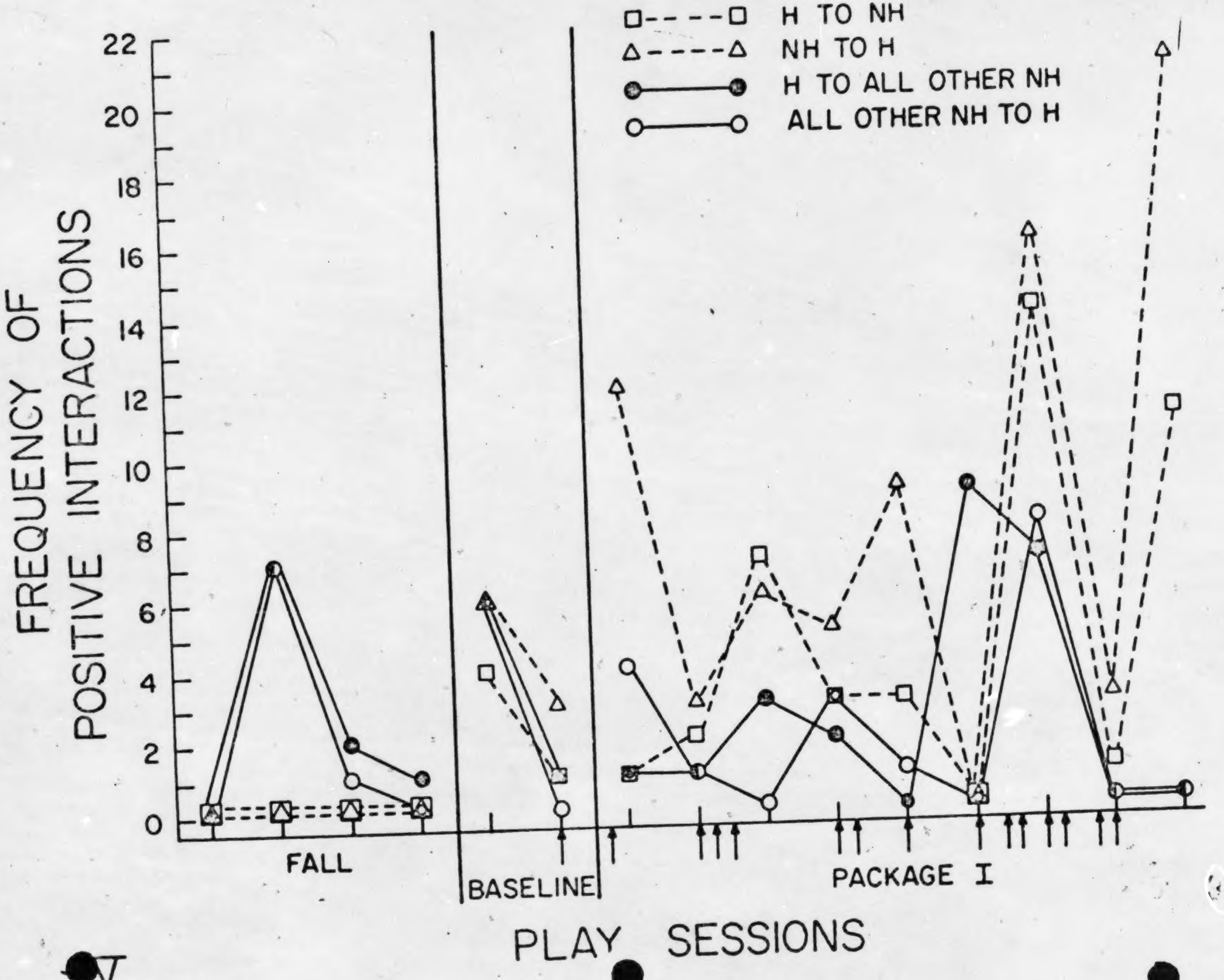
Fig. 18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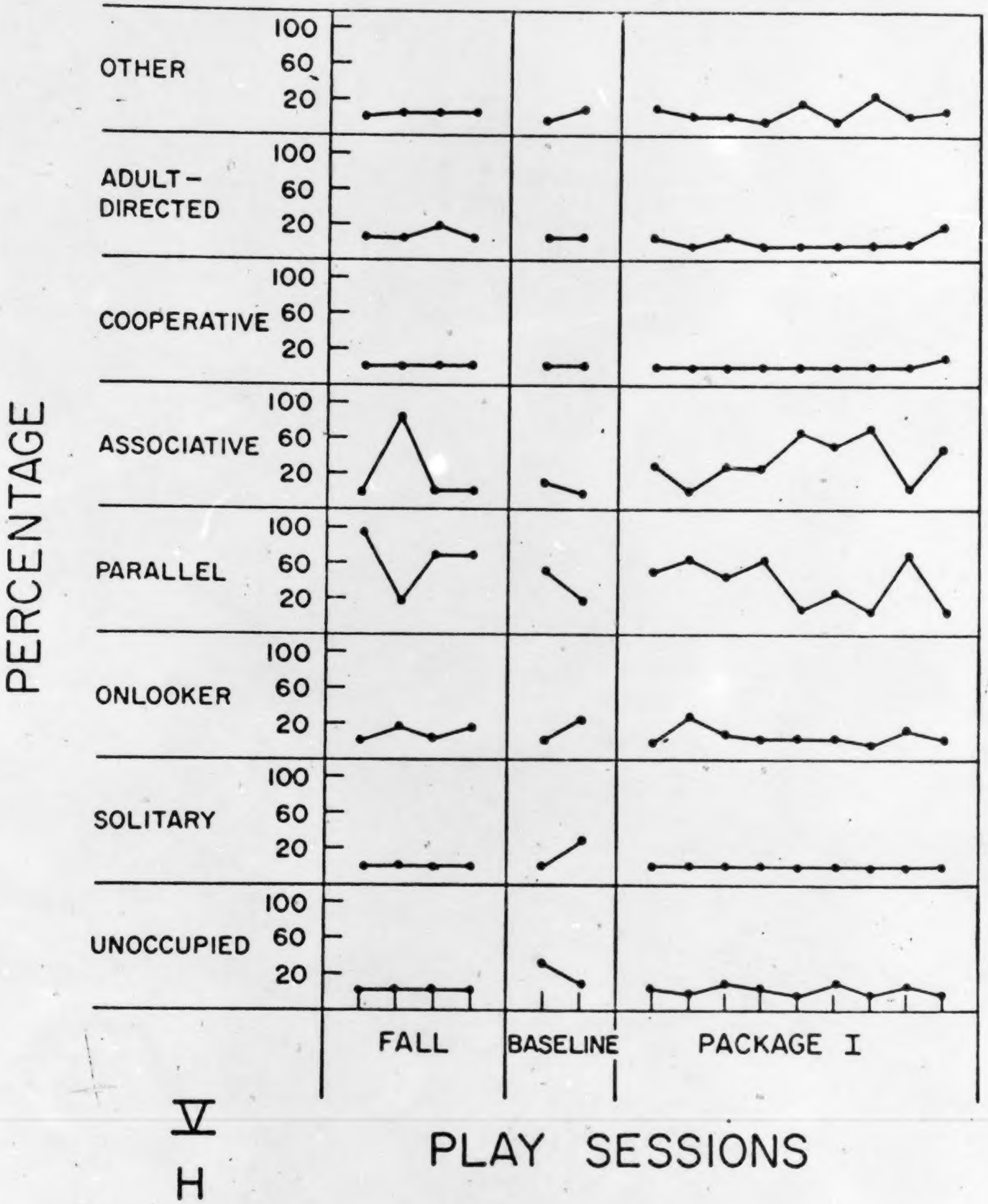
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PLAY SESSIONS

Fig. 19

General Conclusions

I will not attempt to draw any sweeping conclusions in this section related to the mass of data collected and analyzed in this study. Each section can stand on its own and conclusions and more general implications have been stated in these chapters. It is important to note that, from my perspective, these data have permitted me to formulate some clear directions--theoretically, methodologically, and practically, but many significant questions remain unanswered.

Nevertheless, I think it is appropriate to complete this effort with the two comments that follow. First, it is recognized that public policy, especially in education, often tends to be determined by concepts that have limited empirical support. In the main, it is not the fact that such data are discounted or considered irrelevant, but rather that meaningful and scientifically-based data that have clear public policy implications are simply not available. Given this state of affairs, I would urge that data gathered after policy implementation, such as those described here, be utilized to support or modify existing policies. I remain convinced, perhaps naively so, that a sound data base relevant to public policy can be a major ingredient in decision making. Unfortunately, the scarcity of data meeting these criteria have not permitted an adequate test of this proposition.

Second, I would suggest that success in understanding the mainstreaming process at the early childhood level will grow and be limited by our knowledge of fundamental child development issues. In this particular case, our knowledge of child-child interactions is critical. Fortunately, the past decade has revealed a reawakening of interest by researchers and theoreticians with regard to the nature and value of peer relations. In my opinion, it is only through the integration of these areas and the vigorous application and testing of fundamental developmental concepts that optimal educational and therapeutic environments can be established.